The Navigator's Guide to

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ORe

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ENCORE —
the Evolutionary Computation Repository Network

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Abstract

This non-technical report provides a concise overview on ENCORE, the Evolutionary Computation Repository Network, with it's current entry points, based at EUnet Deutschland GmbH, the Santa Fe Institute, Wayne State University, the Chinese University of Hong Kong, the University of Capetown, South Africa, and the University of Warwick, Coventry, UK.

We also introduce the various conventions used in assembling this service, and give a gentle "hands on" ENCORE description by using demo sessions of traditional and state-of-the-art Internet access tools. Moreover, some of the future aspects of this service are discussed.

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"Grey, dear friend are all your theories,
the golden tree of life is green."
— Mephistopheles in Goethe's Faust

"Do not seek to follow in the footsteps of the wise.
Seek what they sought."
— Basho's Zen

1 Introduction

The ENCORE project, now in its *test drive*, is a unique endeavor to tie together publicly available resources related to the field of *Evolutionary Computation* from various "local" FTP sites maintained by research groups all around the globe.

In the terminology used in this handbook, we address individual nodes in the ENCORE network as *EClairs*, with the default EClair being hosted by the MIT Press Alife BBS at the Santa Fe Institute. This EClair serves as the blueprint for all other EClairs, which are simply *mirror sites* in Internet jargon, of the Santa Fe node. All currently accessible EClairs are listed in Table 1.

The idea that finally lead to the ENCORE project[1] emerged during compilation of *The Hitch-Hiker's Guide to Evolutionary Computation* [HB94], a monthly posting in UseNet's **comp.ai.genetic** newsgroup, where it serves as a so-called FAQ.[2]

The major part of that FAQ gives pointers to various FTP sites that store information concerning Evolutionary Computation, and from there the simple question arose: *"What about a unique source location for electronically available resources on EC?"*

Thus, ENCORE is a first try to answer this question. It provides a repository for about 95% of the resources previously only pointed to by the FAQ. The FAQ itself can also be found at the ENCORE site in the `EC/FAQ` folder.

The main sources of the resources mentioned in the FAQ were the *SyS FTP server* `lumpi.informatik.uni-dortmund.de`, which the author had previously set up before taking over ENCORE, and the *Navy server* `ftp.aic.nrl.navy.mil`, which hosts the well-known "GA Digest" under its `/pub/galist` hierarchy, along with many other contributions from the GA community.

Only recently, Jeffrey Horn (then at) the Illinois Genetic Algorithms Laboratory (IlliGAL) has set up an excellent FTP server containing publications, and software of their group. The announcements related to this service are available from within ENCORE as `EC/cfp/illigal-repository.gz`

ENCORE is intended to serve as a "first straw" for beginners, i.e. students[3] and individuals from other disciplines, who like to take an *interactive walk* and browse through the material gathered here. This brings up the question as to which material is chosen to be included in ENCORE. What material is considered most relevant?

[1] i.e., it's precursor SAFIER

[2] FAQs are lists of Frequently Asked Questions and their respective answers, that are posted regularly to a newsgroup to help to keep the "boring stuff" out of the groups discussion threads. Most of the FAQs are available monthly in **news.answers**, but all of them are kept on a single FTP site and are thus available any time via anonymous FTP in the `rtfm.mit.edu:/pub/usenet/news.answers` folder; an overview in several parts is available as: `rtfm.mit.edu:/pub/usenet/news.answers/periodic-postings/part?`

[3] The author of this paper was "just" a graduate student at UniDO, the University of Dortmund, Germany; when he published the FAQ and launched the ENCORE project

AFRICA	ftp://ftp.uct.ac.za/pub/mirrors/EC
ASIA	ftp://ftp.cs.cuhk.hk/pub/EC
EUROPE	ftp://ftp.Germany.EU.net/pub/research/softcomp/EC
	ftp://ftp.dcs.warwick.ac.uk/pub/mirrors/EC
USA	ftp://alife.santafe.edu/pub/USER-AREA/EC
	ftp://ftp.krl.caltech.edu/pub/EC
	ftp://ftp.cs.wayne.edu/pub/EC

Table 1: The ENCORE network: EClairs and their geographic location around the globe.

This question can be answered easily. Included is everything that's considered useful for *educational* purposes. Given that this service tries to get the different evolutionary computation paradigms together, papers which try to define the similarities and differences between the various pathways currently being subsumed under the term EC (see e.g. [HB91, BRS93]) are preferred.

On the other hand, papers should also focus on analysis and show differences from more traditional heuristics in an easily understandable way (see e.g. [MH93]), discuss possible alternative directions of research [Khu94, KBH94a, KBH94b], give gentle surveys on a particular issue [FAT94], or provide tutorial introductions to a whole EC paradigm [Whi93, BBM93a, BBM93b].

Also, apart from these sometimes rather dry theoretical approaches to the research field, almost all currently available software packages which are related to the `EC` field have been included into ENCORE for the "learning-by-doing" concept which is useful in scientific research. These software packages generally come bundled in the respective folders labeled `src`, together with user manuals, wherever available, and other software-related documentation which are kept in the `docs` folders.

Since ENCORE's philosophy is to provide an "as-easy-as-possible" entry to the whole field, the language barrier is also tackled. Papers can be submitted in any language. At present, there're papers in English, German and Greek.

Further information concerning naming conventions and other set-up related policies implemented in ENCORE are given in Section 2. In Section 3 a navigation through ENCORE is presented using both the traditional, and somewhat arcane, FTP command line interface, as well as Squirrel the EUnet E-mail server, and NCSA `Mosaic`, a "point-and-click" interface of the latest information systems technology that comes with the World Wide Web hypermedia project. Finally, we provide some insights on the future aspects of ENCORE, and give a complete listing of the current contents, in the Appendix.

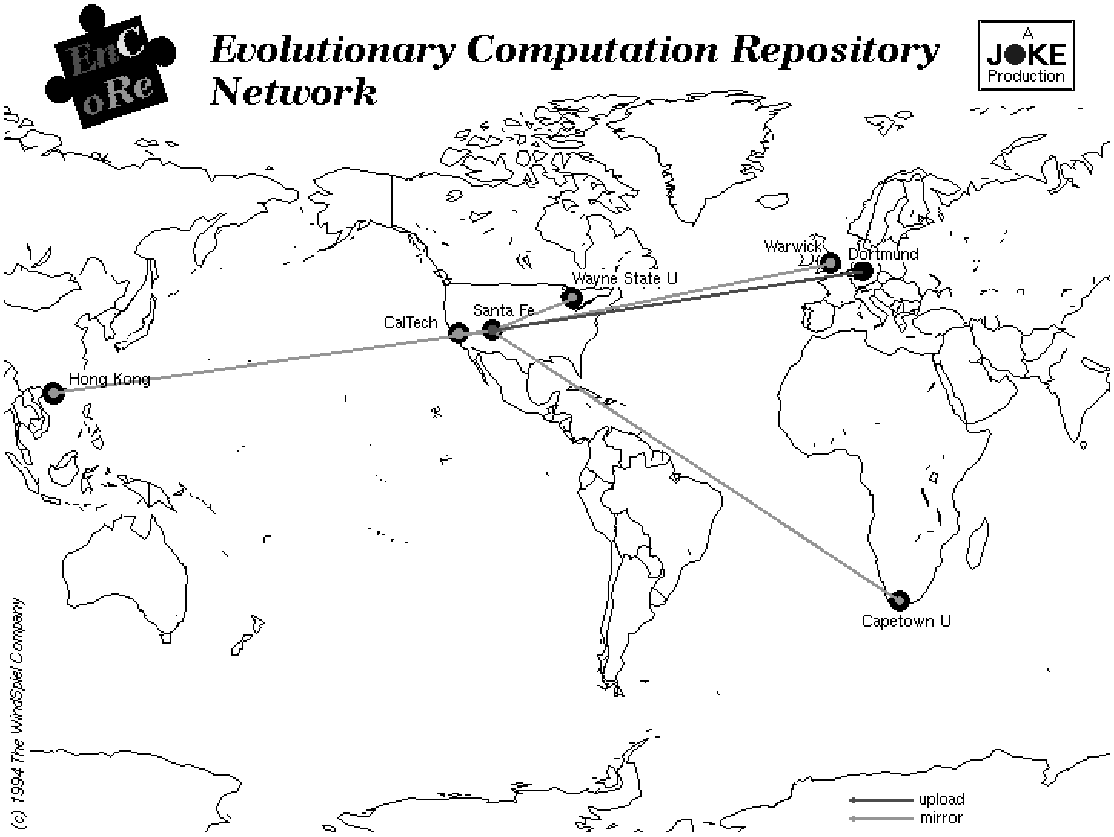

Figure 1: The currently available EClairs within ENCORE.

2 Overview

Some conventions have been developed during the set-up of ENCORE. For example, whenever we refer to a particular file, on a particular FTP server, we give its name in the following, so-called URL (Uniform Resource Locator) form:

```
ftp://<FTP-server>/<path-to-EClair>/EC/<file-name>
```

In the "hands on" section below (see section 3), we demonstrate how to get the file:

```
ftp://alife.santafe.edu/pub/USER-AREA/EC/CONTENTS
```

which holds the complete contents of ENCORE, as its name indicates.[4] Within the various `README` files that explain the actual directory contents to the ENCORE navigator, we use a "short cut" form of the above to address files, e.g. the `CONTENTS` files gets refered to as:

```
../EC/CONTENTS
```

due to the simple fact, that

```
<FTP-server>/<path-to-EClair>
```

varies from site to site.

We also part with another tradition that you might be familiar with from other FTP services. That is, on the first visit to a new FTP site one usually *greps*[5] through a file named `ls-lgR` after downloading it. This file is simply a directory listing produced by the FTP administrator using the UNIX command `ls` with options `-lgR` (i.e., a recursively descendent directory listing of the complete server contents). ENCORE uses a file called `CONTENTS` to illustrate this information, as is depicted in Figure **??**. It consists of all the `README` files one will encounter while navigating through the various sections of the directory tree, and the top-level `OVERVIEW` file. The latter displays the whole directory structure in a graphical fashion, that is much clearer than the traditional `ls-lgR` listing. Hence, this file should be your first choice to "take away" on your first visit to ENCORE (see Section 3). It will also answer most of your current questions, e.g. how to contribute material to this service.

The files stored in ENCORE are either PostScript documents, denoted by the suffix `.ps`, plain ASCII text files, denoted by the suffix `.txt`, or so-called *tarfiles* identified by `.tar` which are archives containing many files, and even whole directory trees glued together into a single file, using the UNIX standard `tar` command. All these ENCORE data files (as opposed to the administrative files, which were discussed earlier e.g. `README`s, `CONTENTS`, etc.) have been compressed to reduce the amount of storage space needed for the whole service. We generally use the GNU project's compression utility `gzip`, and it's pendant for de-compression, `gunzip`, for this purpose, as indicated by a file's `.gz` suffix, mainly because of availability reasons and because of the fact that it is currently the best compression utility as far as size reduction is concerned.[6]

The GNU project's tools, usually come in source code form, and thus can be built and set-up very easily by your local system administrator. They are usually also available for

[4] You will come across this "filename-tells-the-contents-policy" consistently in all administrative files.

[5] A hackish (slang) idiom, derived from UNIX program `grep(1)`, that lets you search for so-called *regular expressions*, or simply *strings*, contained in text file(s).

[6] There are only some fex exceptions from this rule, whenever packages are MS-DOS only, they come as `.zip` files; use PkWare's pkunzip or compatible unzipping software; note that GNU gunzip cannot handle the PkWare format.

most microcomputer platforms, hence executables of `gzip` and `gunzip` exist for MS/PC-DOS. Table 2 lists the currently relevant GNU FTP repositories where the compression tools, among many other things, can be found.

ASIA	ftp.cs.titech.ac.jp utsun.s.u-tokyo.ac.jp/ftpsync/prep cair.kaist.ac.kr/pub/gnu
AUSTRALIA	archie.au/gnu (archie.oz or archie.oz.au for ACSnet)
AFRICA	ftp.sun.ac.za/pub/gnu
MIDDLE-EAST	ftp.technion.ac.il/pub/unsupported/gnu
EUROPE	irisa.irisa.fr/pub/gnu ftp.univ-lyon1.frpub/gnu ftp.mcc.ac.uk unix.hensa.ac.uk/pub/uunet/systems/gnu src.doc.ic.ac.uk/gnu ftp.win.tue.nl ugle.unit.no ftp.denet.dk ftp.informatik.rwth-aachen.de/pub/gnu ftp.informatik.tu-muenchen.de ftp.Germany.EU.net/pub/packages/gnu ftp.eunet.ch nic.switch.ch/mirror/gnu nic.funet.fi/pub/gnu isy.liu.se ftp.stacken.kth.se ftp.luth.se/pub/unix/gnu archive.eu.net
CANADA	ftp.cs.ubc.ca/mirror2/gnu
USA	wuarchive.wustl.edu/mirrors/gnu labrea.stanford.edu ftp.kpc.com/pub/mirror/gnu ftp.cs.widener.edu uxc.cso.uiuc.edu col.hp.com/mirrors/gnu ftp.cs.columbia.edu/archives/gnu/prep gatekeeper.dec.com/pub/GNU ftp.uu.net/systems/gnu

Table 2: The GNU project's (de-)compression utility `g(un)zip`(1) is available from various sites around the globe.

After downloading a gzip'ed file in *binary mode* from ENCORE and decompressing it using `gunzip`, what you do next depends on the type of file that was downloaded. If it is a PostScript file, then you can use a PostScript viewer to view its contents or print the document to a PostScript printer to read its contents. If the file is an ASCII text file, then you can use a standard text editor to view its contents or print the file to any printer for reading. If the file has a `.tar` extension, then just type "`tar xvf thefile.tar`", where "`thefile`" denotes the name of the downloaded, uncompressed file. This would produce the relevant files in your directory.

3 “Hands On” ENCORE

3.1 Using traditional FTP

On your first visit to ENCORE you should get the previously mentioned `CONTENTS` file, as explained in the following. First you must login to the FTP[7] server at Santa Fe by typing the following at the system prompt (Note that the string `example%` denotes the system prompt in this example):

```
example% ftp alife.santafe.edu
```

You will then see the following messages appearing on your screen:

```
Connected to alife.santafe.edu.
220-  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
220-
220-   Anonymous access to the MITPRESS Artificial Life Bulletin Board System
220-
220-   ftp alife.santafe.edu
220-   Login: anonymous
220-   Password: (Your email address)
220-
220-  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
220-
220 alife FTP server (Version 2.0WU(10) Mon Apr 12 10:49:51 MDT 1993) ready.
```

At this point you want to enter the server as user `anonymous` and thus should type:

```
Name (alife.santafe.edu:foobar): anonymous
```

The FTP daemon then checks to see if user `anonymous` is a valid user-id, i.e., person on this system and whether s/he is allowed to enter at this time. If everything goes well, after the check the procedure continues:

```
331 Guest login ok, send your complete e-mail address as password.
Password:
```

Just enter your e-mail address after the `Password:` prompt, and you’re in. The following messages will flash on your screen:

```
230-
230-  ALIFEBBS FTP / - Artificial Life BBS top level FTP directory
230-
230-  Directory: ~ftp           Path: ~ftp
230-
230-        Welcome to the ALIFEBBS FTP area at alife.santafe.edu...
230-
230-        Everything useful is in the ``pub'' directory so please
230-        type ``cd pub'' to go there...
230-
230-        If you have any questions or problems with this service,
230-        please send email to <ftp@alife.santafe.edu>.
```

[7]FTP denotes “File Transfer Protocol,” i.e., a service which allows anybody to log into a remote computer on any place on the globe, to transfer files to or from this machine. Here we describe the read-only side of ENCORE only.

```
230-
230-Please read the file README
230-  it was last modified on Sat Oct 16 05:34:12 1993 - 147 days ago
230 Guest login ok, access restrictions apply.
```

Now go to the appropriate folder by using the `cd`, i.e., “change directory” command:

```
ftp> cd pub/USER-AREA/EC
```

and ENCORE’s welcome message pops up:

```
    Welcome to

              _/_/_/ _/      _/  _/_/     _/_/   _/_/_/   _/_/_////
             _/     _/_/    _/ _/   _/  _/   _/ _/   _/  _/
            _/     _/ _/   _/ _/       _/   _/ _/   _/  _/
           _/_/_/ _/  _/  _/ _/       _/   _/ _/_/_/   _/_/_/
          _/     _/   _/ _/ _/       _/   _/ _/  _/   _/
         _/     _/    _/_/ _/    _/ _/   _/ _/   _/  _/
        _/_/_/ _/      _/  _/_/_/    _/_/  _/    _/ _/_/_/////

        The EvolutioNary COmputation REpository network.

      This is the EClair at the Santa Fe Institute.
    ftp://alife.santafe.edu/pub/USER-AREA/EC/ (192.12.12.99)

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

  250-Please read the file README
  250-  it was last modified on Sat Dec 11 17:44:10 1993 - 3 days ago
  250 CWD command successful.
  ftp>
```

For a directory listing just type:

```
ftp> dir
```

which will result in the following output:[8]

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
total 71
-rw-r--r--  1 joke     encore        797 Aug  5 15:33 .message
drwxr-xr-x  6 joke     encore        512 Aug  6 17:35 CFS
-rw-r--r--  1 joke     encore      39900 Aug 11 17:44 CONTENTS
drwxr-xr-x  5 joke     encore        512 Aug  6 17:36 EA
drwxr-xr-x  5 joke     encore        512 Aug  6 17:35 EP
drwxr-xr-x  5 joke     encore        512 Aug  6 17:34 ES
drwxr-xr-x  2 joke     encore        512 Aug  6 17:35 FAQ
```

[8]Note, that due to the “nature of the beast” this listing is subject to change more rapidly than this handbook is updated, so don’t be surprised if you find slight differences.

```
drwxr-xr-x  6 joke     encore        512 Aug 10 16:06 GA
drwxr-xr-x  6 joke     encore        512 Aug 11 15:32 GP
-rw-r--r--  1 joke     encore       6267 Aug 11 17:44 OVERVIEW
-rw-r--r--  1 joke     encore       3258 Aug 11 17:44 README
drwxr-xr-x  2 joke     encore        512 Aug  6 17:36 cfp
drwxr-xr-x  2 joke     encore        512 Aug  6 17:36 eclairs
drwxr-xr-x  3 joke     encore        512 Aug  6 17:35 etc
drwxr-xr-x  3 joke     encore        512 Aug  6 17:35 handbook
drwxr-xr-x  3 joke     encore        512 Aug  6 17:35 jobs
drwxr-xr-x  2 joke     encore        512 Aug  6 17:35 refs
drwxr-xr-x  2 joke     encore        512 Aug  6 17:35 thesis
226 Transfer complete.
1093 bytes received in 0.88 seconds (1.2 Kbytes/s)
ftp>
```

Finally, you're ready to *download* the `CONTENTS` by typing:

```
ftp> get CONTENTS
```

During the transfer, which copies the files down to your local account (computer), the FTP daemon issues the following messages:

```
200 PORT command successful.
150 Opening ASCII mode data connection for CONTENTS (41305 bytes).
226 Transfer complete.
local: CONTENTS remote: CONTENTS
42393 bytes received in 17 seconds (2.5 Kbytes/s)
```

At this point all that's left to do is to say:

```
ftp> bye
221 Goodbye.
```

3.2 Example

To give an example, we now demonstrate how to find source code of *Classifier Systems* implementations. The login procedure is the same as above, up to the `cd /pub/EC` step; but now we enter the `CFS` section of ENCORE:

```
ftp> cd CFS
```

And get the following message, that points you to the `README` file explaining the contents of the current folder:

```
250-Please read the file README
250-  it was last modified on Sat Aug 11 17:44:13 1993 - 3 days ago
250 CWD command successful.
```

We want to see more of the folder's contents, and just say:

```
ftp> dir
```

And get the following message, that points you to the `README` file The `CFS` section, like all other sections, has the following structure. A `README` file that you are pointed to on entering a folder, a `docs` folder for software-related documentations, i.e., user manuals, handbooks, etc. The `etc` folder contains miscellaneous items, that doesn't fit into the other categories. The directory labeled `papers` contains research papers concerned with CFSs, and `src` contains source code:

```
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
total 5
-rw-r--r--  1 joke     encore        487 Aug 11 17:44 README
drwxr-xr-x  2 joke     encore        512 Aug  6 17:35 docs
drwxr-xr-x  2 joke     encore        512 Nov 19 08:17 etc
drwxr-xr-x  2 joke     encore        512 Aug  6 17:34 papers
drwxr-xr-x  2 joke     encore        512 Aug 11 15:44 src
226 Transfer complete.
311 bytes received in 0.054 seconds (5.7 Kbytes/s)
```

Well, the latter is what we're searching for, so we enter:

```
ftp> cd src
```

And we're again pointed to the next level's `README`:

```
250-Please read the file README
250-  it was last modified on Sat Aug 11 17:44:14 1993 - 3 days ago
250 CWD command successful.
```

Again, we like to see what's in here, and thus type:

```
ftp> dir
```

Resulting in the following listing:

```
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
total 1153
-rw-r--r--  1 joke     encore        906 Aug 11 17:44 README
-rw-r--r--  1 joke     encore     491438 Aug  5 15:58 cfsc-1.02.tar.gz
-rw-r--r--  1 joke     encore     461172 Aug  5 16:03 cfsc-1.98j.tar.gz
-rw-r--r--  1 joke     encore     191181 Aug 11 15:40 scsc-1.3j.tar.gz
226 Transfer complete.
292 bytes received in 0.015 seconds (18 Kbytes/s)
ftp> bye
```

We know from the `CONTENTS` file that `scsc-1.3j.tar.gz` is our desired package, and thus turn on `bin`ary transfer mode, and *download* the file using FTP's `get` command:

```
ftp> bin
200 Type set to I.
ftp> get scsc-1.3j.tar.gz
```

During file transfer the following messages are issued:

```
200 PORT command successful.
150 Opening BINARY mode data connection for scsc-1.3j.tar.gz (191181 bytes).
226 Transfer complete.
local: scsc-1.3j.tar.gz remote: scsc-1.3j.tar.gz
191181 bytes received in 89 seconds (2.1 Kbytes/s)
ftp>
```

Again, all that's left to do is to say:

```
ftp> bye
221 Goodbye.
```

Note: At present, download definitely works in the binary transfer mode, as described above on all EClairs. The site at EUnet Deutschland allows for "on-the-fly" decompression, i.e., all one has to do is to issue a `get` command without the `.gz` suffix, which tells the FTP daemon to automatically decompress the file prior to sending it over the line to your system. Unfortunately, this service needs some twisting with the FTP daemon's set-up, and thus will not be supported by all EClairs.

3.3 Using the Softbot Squirrel via E-mail

ENCORE access by e-mail is currently only available via the EClair at EUnet. Send e-mail to our Softbot Squirrel, aka `<archive-server@Germany.EU.net>` with "help" in the message body for a short description of the commands recognized by Squirrel.

As an example, we show how to get the latest copy of "The Hitch-Hiker's Guide to Evolutionary Computation", aka the FAQ to Usenet's **comp.ai.genetic**; and the "Navigator's Guide to ENCORE"; for these two you would mail the following:

```
To: archive-server@Germany.EU.net
Subject:
--
begin
get research/softcomp/EC/FAQ/hhgtec.ps.gz
get research/softcomp/EC/handbook/encore.ps.gz
quit
```

3.4 Using the World Wide Web

The World Wide Web project was launched in 1989 at CERN, the European Particle Physics Laboratory at Genf, Swiss, and is described by its creator Tim Berners-Lee in [BL92]. However, printed information on a hypermedia project seems somewhat "out-of-place," and thus most information are available via the project's electronical network.

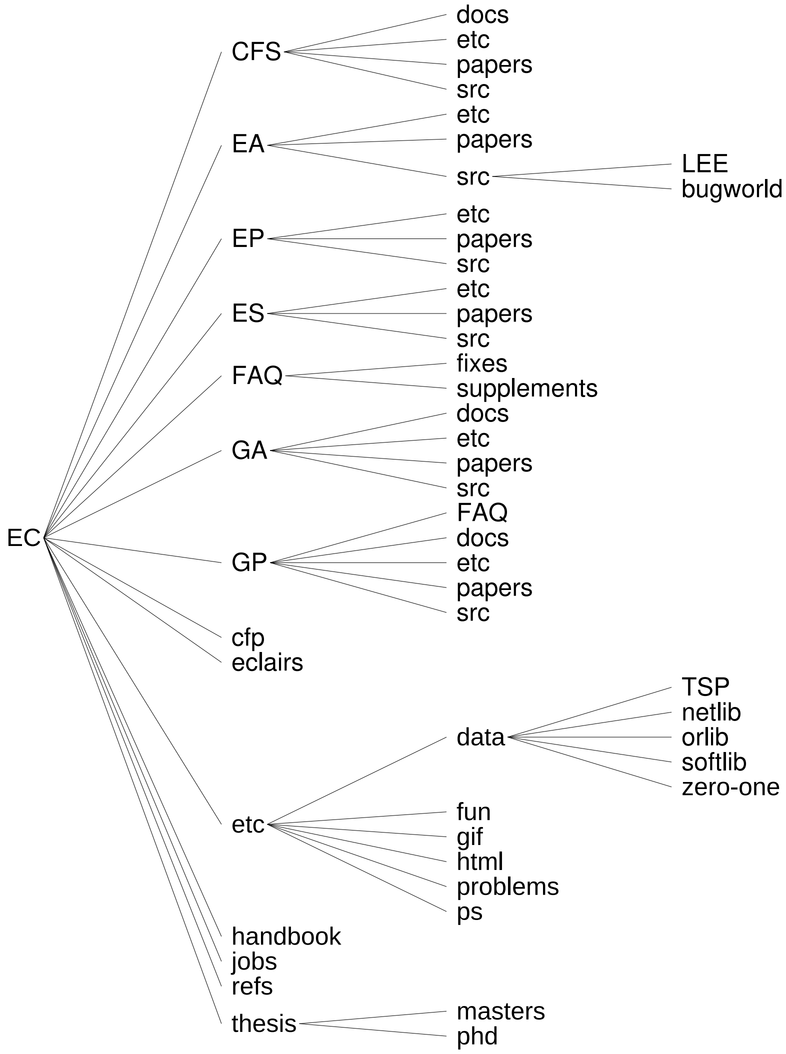

Figure 2: The currently available sections within ENCORE: `GA` = Genetic Algorithms, `ES` = Evolution Strategies, `GP` = Genetic Programming, `EP` = Evolutionary Programming, `CFS` = Classifier Systems, `cfp` = Call for Papers, `etc` = Miscellaneous, `refs` = Bibliographies, `thesis` = Master's thesis or equivalent, and PhD dissertations, `jobs` = jobs, post-doc, and other career-oriented offerings. Refer to `CONTENTS` for a concise description of every single file contained in ENCORE.

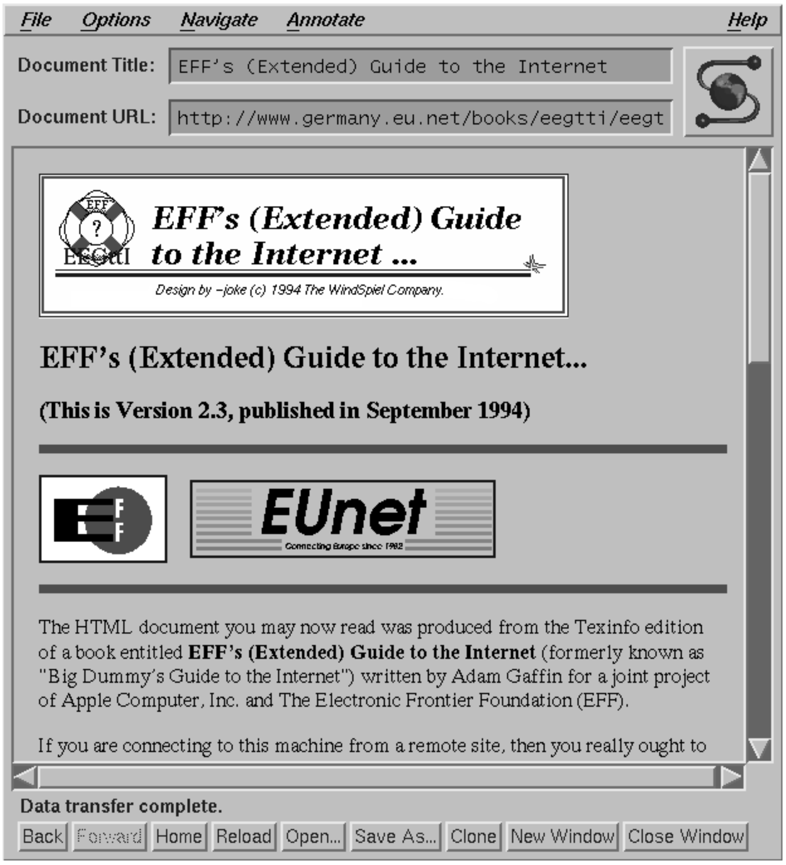

Figure 3: Mosaic with URL pointing to the W3 version of "EFF's (Extended) Guide to the Internet" `http://www.germany.eu.net/books/eegtti/eegtti.html`

For example, you might telnet to `info.cern.ch` and follow the route to World Wide Web (WWW, or W3 in its own terms). An introduction to W3 can also be found in the freely available book *EFF's (Extended) Guide to the Internet* [GH94].

Naturally, even this guide is accessible via WWW, so just point your W3 client's URL to: `http:// www.Germany.EU.net/ books/eegtti/eegtti.html` and browse the currently most read book on Internet, via Internet's latest information systems technology, as depicted in Figure 3.

We cannot give a complete introduction in this handbook, so for more information especially concerning W3 server/client implementation for your local platforms, get a copy of the W3 FAQ in Usenet's **comp.infosystems.www** newsgroup.

3.4.1 Browsing through ENCORE

In the following, we navigate ENCORE using NCSA's `Mosaic`, that has been developed at the *National Center for Supercomputing Applications* at the University of Illinois, Urbana-Champaign.

The first thing to do is to open a new URL, i.e., the Uniform Resource Locator, an addressing schemethat is used by the W3 project to identify any nodes in its hypernet. In `Mosaic`, just click on the `File` menu, and activate the `Open URL` item, as is shown in Figure 4 and type in `ftp://alife.santafe.edu/pub/USER-AREA/EC` in the box.

Then you click on the `Open` button and `Mosaic` establishes the connecting, download the information and displays them graphically, as in Figure 5.

Underlined items, generally denote hypertext links, that can be opened with a single mouse click. If the link is a folder, it is opened and the contents is displayed, as has been done with the `CFS` link to the *Classifier Systems* section in Figure 6.

Clicking on a text file, e.g. a `README` will result in a download and subsequent display of this file in `Mosaic`'s main window.[9] You then can save the file in various formats (ASCII text, PostScript, etc.) to a file by clicking on the `Save As...` button on the bottom of the window.

Compressed files, either being compressed with the UNIX standard compression utility `compress`, that uses the `.Z` suffix, or being compressed with GNU's `gzip` tool, are automatically uncompressed when you click on their hyperlink.

Finally, Figure 7 displays the contents of the CFS section's source code folder (cf. Section 3.2, on page 8).

A single click on any of the packages will tell `Mosaic` to download the package to your local `/tmp` directory.

[9] This is dependant on your local `Mosaic` set-up. By default, a click with the middle mouse button, display the result in a separate window.

Figure 4: Mosaic with URL pointing to ENCORE's EClair at EUnet Deutschland GmbH `ftp://ftp.Germany.EU.net /pub/research/softcomp/EC`

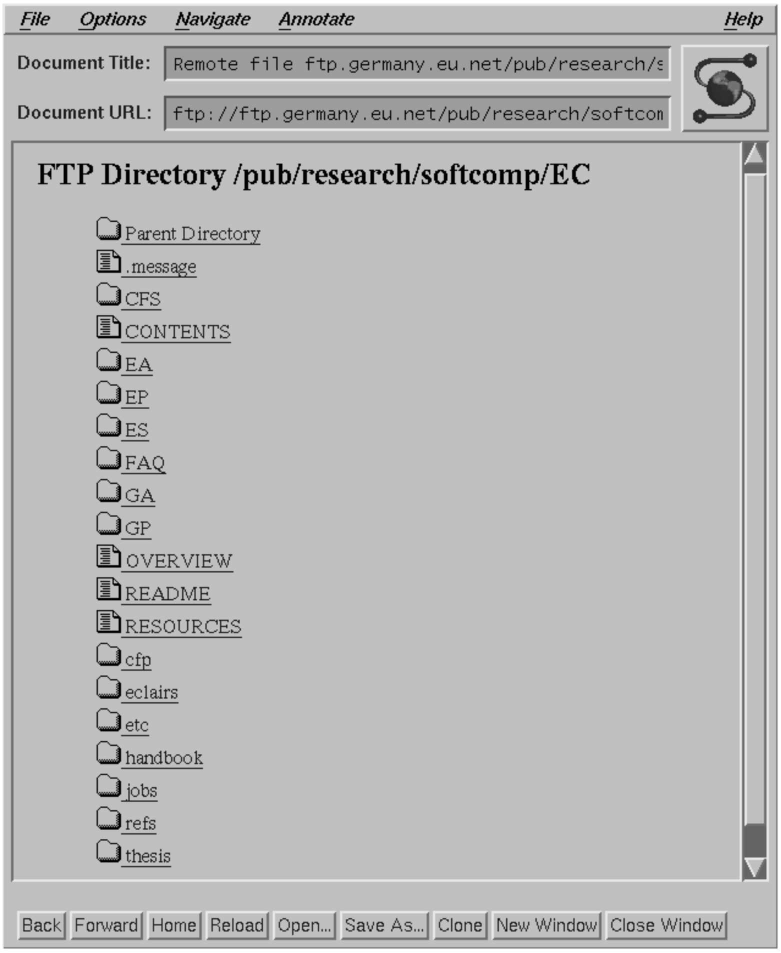

Figure 5: Mosaic with URL `ftp://ftp.Germany.EU.net/pub/research/softcomp/EC` loaded: Your first choice to "take away" should be the `CONTENTS` file that consists of all of ENCORE's `README` files concatenated. And, of course, the file `encore.ps.gz` in the `handbook` folder, that contains the papers you're just reading.

Figure 6: The Classifier Systems (CFS) section, with the same structure as all other sections: (1) a `README` file explaining the folder's contents; (2) a `papers` folder for research papers; (3) a `docs` folder for software documentation; (4) a `src` folder for software packages; and (5) `etc` for miscellaneous.

Figure 7: Some software packages in the CFS section: (1) Riolo's original CFS-C; (2) An ANSI-C/unixoid version of Riolo's CFS-C; (3) SCS-C: A C adaptation of Goldberg's Simple Classifier System SCS.

4 Summary

ENCORE, in it's present form, is a well-structured, well-documented starting point, as well as a potential evolvable entity, that hopefully contains enough *critical mass* to make it a valuable addition to the scattered "local services" that one had to know before ENCORE was launched.

We consider ENCORE far from being complete, especially since we think that many more TCGA, and IlliGAL reports should make their way into the collection. Currently the GP and EP communities are almost not represented, but definitely deserve more than their present "bare bones" sections. The same holds true for the CFS section.

We also hope that more members of the research community will copy their papers, software, data test suites, etc. to ENCORE, while maintaining their local FTP servers.

We look forward to your inputs, may it be comments, suggestions, and –most welcome– time to devote to the development of this project. Nobody, however, can handle this service on his own, so if you think that this *cute thing* shouldn't die, but *fly*, send an electronic mail to the ENCORE maintainer and participate in a discussion of the possible future of ENCORE.

Hope to hear from you soon.

Acknowledgments

The author would like to thank some very special people who helped a lot during the set-up of this service.

Foremost, thanks to Scott Yelich, Nelson Minar and Chris Langton at the Santa Fe Institute for hosting the default EClair on the Alife Online server. Thanks to Angus Siu at the Chinese University of Hong Kong who provided the first mirror site. Martyn Amos for the 2nd one at the University of Warwick. Titus Brown and the Avida Alife group at the California Institute of Technology for hosting the 3rd, "West-Coast" reflector. Thanks to Chan Jin Chung of Prof. Reynold's group for taking care of the 4th mirror at Wayne State U, Detroit. And last not least Russell Vincent at the University of Capetown, South Africa for the 5th one, that also established ENCORE on a new, important continent.

David Beasley (then at Cardiff University, UK), smoothed out some of my variations on the English language, as well as served as a critical reviewer, and mostly wise companion over the past years.

Special thanks to Davika Seunarine now at Bell-Northern Research Labs for reviewing an early draft of this paper. And Tom Scholz for helping me to *Walk On...*

Moreover I'd like to thank all those individuals, too numerous to mention here, who helped in assembling the *Hitch-Hiker's Guide to Evolutionary Computation*, i.e., the FAQ to the **comp.ai.genetic** newsgroup. It was, i.e., it still *is*, definitely a worthwhile experience.

This work is not supported by any research grant; it's yet another weekend project by the author. However, EUnet Deutschland GmbH spnsored free (weekend- and) net-access through their machinery; so, thanks!

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Appendix: the current ENCORE contents

```
--- ../EC/$Id: README,v 1.9 1994/11/27 17:54:52 joke Rel $

    Welcome to

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          _/     _/   _/ _/ _/       _/   _/ _/  _/   _/
         _/     _/    _/_/ _/    _/ _/   _/ _/   _/  _/
        _/_/_/ _/      _/  _/_/_/    _/_/  _/    _/ _/_/_////

        The EvolutioNary COmputation REpository network.

      * Dortmund (D) * Santa Fe (USA) * Hong Kong (HK) * Warwick (UK) *
    Pasadena (USA) * Detroit (USA) * Capetown (ZA) *


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    "We act as though comfort and luxury were the chief requirements
     of life, when all that we need to make us happy is something
     to be enthusiastic about."        -- Albert Einstein

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    INTRODUCTION

    This directory hierarchy, titled ENCORE, contains a documented collection,
i.e., compilation of electronically available resources related to the field
of Evolutionary Computation (EC). It is divided into several categories
that reflect the current main research paradigms: Genetic Algortihms (GA),
Evolution Strategies (ES), Evolutionary Programming (EP), Genetic Programming
(GP), and Classifier Systems (CFS).

All these specialized sub-hierarchies are completed with a general Evolutionary
Algorithm (EA) folder for hybrid or other approaches not contained in the
previous list.

Electronically available resources in this context means compressed PostScript
(cf CONVENTIONS) versions of research papers, and journal articles; publicly
available software packages, and test data sets.

    Moreover, ENCORE provides a place for the FAQ (list of Frequently Asked
Questions and their respective answers) of the USENET newsgroup comp.ai.
genetic, for easy access between postings, i.e., the 6 ASCII parts, and the
some 90 pages PostScript version.

    ENCORE is not located at a single location, but a network of servers
carrying the same information. This is necessary, due to the many bottlenecks
of todays Internet that surely has come of age. You thus can chose your
nearest "EClair", as we call the single nodes in the ENCORE network:

      This is the EClair at EUnet Deutschland GmbH
    ftp://ftp.Germany.EU.net/pub/research/softcomp/EC (192.76.144.75)

      This is the EClair at the Santa Fe Institute
    ftp://alife.santafe.edu/pub/USER-AREA/EC/ (192.12.12.99)

      This is the EClair at The Chinese University of Hong Kong
    ftp://ftp.cs.cuhk.hk/pub/EC/ (137.189.4.57)

      This is the EClair at The University of Warwick, UK
    ftp://ftp.dcs.warwick.ac.uk/pub/mirrors/EC (137.205.224.1)
```

This is the EClair at Wayne State University, Detroit
ftp://ftp.cs.wayne.edu/pub/EC (141.217.16.11)

This is the EClair at The University of Capetown, South Africa
ftp://ftp.uct.ac.za/pub/mirrors/EC (137.158.128.1)

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CONVENTIONS

All folders in the ENCORE hierarchy contain a file, named README, which holds information on all the other files in that particular folder.

The addressing scheme for any file in ENCORE is simply the relative path to that file, below the unique ENCORE "../EC" entry point on any EClair. E.g. the README that lists all papers in the genetic algorithm section will be referred to as "../EC/GA/papers/README".

Note that this is necessary, because the path to the unique ENCORE entry point, might be different on different servers.

For a general overview refer to "../EC/OVERVIEW". The complete contents of ENCORE, i.e. a concatenation of all README files, is available in "../EC/CONTENTS"

All PostScript and ".tar" files have been compressed to reduce disk space using the GNU compression utility "gzip". You thus have to use "gunzip" to decompress the files after downloading. See below for a list of the GNU project mirror sites around the globe in case you don't have it yet.

For further explanations consult "The Navigator's Guide to ENCORE". It's available as "../EC/handbook/encore.ps.gz" for A4 paper, and "../EC/handbook/encore-US.ps.gz" contains an US letter size version.

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FORMATS

Some of the papers contained in this collection are formatted according to standard A4 paper; some use US letter size. If you print out a paper and find that some lines on top have been chopped off, you're probably printing a A4 formatted paper on a US letter size sheets of paper.

In this case, you simply should prepend the file ../EC/etc/ps/a4-fix.ps to the PostScript paper using your favourite text editor. Anyway, previewing a paper with e.g., the freely available GhostView/ghostscript from GNU is always recommended, prior to printing.

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CONTRIBUTIONS

Your contributions are always welcome. Send papers, software, etc. via e-mail to the current ENCORE maintainer, preferably including a short (3-4 lines) description, that can just be "dropped" into the appropriate README file. Moreover, it's recommended to format papers such that they can be printed on both A4 and US letter size PostScript printers.

Thanx in advance for your interest in free global information share.

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LANGUAGES

Most of the current contents of ENCORE is written in English, apart from 2 papers in German. If you have introductory texts available in languages other than English, don't worry. You're strongly encouraged to make these avail. via ENCORE; we try to become as "multilingual" as possible.

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MIRRORING

If you want your site to become an official EClair, and want to be added to the official crop of ENCORE sites, all you need to do is to (a) properly install a mirror kit, e.g. ftp://ftp.germany.eu.net/pub/network/inet/ftp, and (b) have a short check up with the current ENCORE maintainer.

Some questions that usually arise when new EClair sites contact me are summarized in ../EC/RESOURCES

You're welcome anytime.

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INQUIRIES

Inquiries addressing general SFI specific issues, e.g. FTP server related problems, should be directed to Nelson Minar <nelson@santafe.edu> for the EClair at Santa Fe, Angus Siu <ttsiu@cs.cuhk.hk> for the server at the Chinese University of Hong Kong. Martyn Amos <Martyn.Amos@dcs.warwick.ac.uk> for the mirror at the University of Warwick, UK; Chan-Jin Chung <encore@cs.wayne.edu> for the mirror at Wayne State U. And Russell Vincent <ftp@uct.ac.za> at the University of Capetown, South Africa.

Send everything else related to ENCORE, i.e. suggestions, contributions, corrections, and all the fish to: joke@Germany.EU.net

```
--
Have fun,       -joke

 ====== ____                               =   Joerg Heitkoetter
 ===== /      /   /    ___    ___  _/_ ==   Director, Research & Development
 ==== /----  /   /  /   /  /___/  /  ===   EUnet Deutschland GmbH
 === /____  /___/  /   /  /___   /  ====   Emil-Figge-Str. 80
 ==                               =====   D-44227 Dortmund
 =  Connecting Europe since 1982  ======   Tel/Fax +49-231-972 -00/-1111
<A HREF="http://www.Germany.EU.net/people/joke.html"> -joke </A>
```

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DISCLAIMER

THE INFORMATIONS GATHERED WITHIN ENCORE COME "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF SOFTWARE DRAWN FROM ENCORE IS WITH YOU. SHOULD A PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

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APPENDIX

The GNU project (un-)compression program gzip(1)/gunzip(1), that has been used to compress all the file within this collection, is available from various sites around the globe, e.g.:

ASIA: ftp.cs.titech.ac.jp, utsun.s.u-tokyo.ac.jp:/ftpsync/prep,
  cair.kaist.ac.kr:/pub/gnu, ftp.nectec.or.th:/pub/mirrors/gnu
AUSTRALIA: archie.au:/gnu (archie.oz or archie.oz.au for ACSnet)
AFRICA: ftp.sun.ac.za:/pub/gnu

```
MIDDLE-EAST: ftp.technion.ac.il:/pub/unsupported/gnu
EUROPE: irisa.irisa.fr:/pub/gnu, ftp.univ-lyon1.fr:pub/gnu,
  ftp.mcc.ac.uk, unix.hensa.ac.uk:/pub/uunet/systems/gnu,
  src.doc.ic.ac.uk:/gnu, ftp.ieunet.ie:pub/gnu, ftp.eunet.ch,
  nic.switch.ch:/mirror/gnu, ftp.informatik.rwth-aachen.de:/pub/gnu,
  ftp.informatik.tu-muenchen.de, ftp.win.tue.nl:/pub/gnu,
  ftp.funet.fi:/pub/gnu, ftp.denet.dk, ftp.stacken.kth.se, isy.liu.se,
  ftp.luth.se:/pub/unix/gnu, ftp.sunet.se:/pub/gnu, archive.eu.net
SOUTH AMERICA: ftp.unicamp.br:/pub/gnu
WESTERN CANADA: ftp.cs.ubc.ca:/mirror2/gnu
USA: wuarchive.wustl.edu:/systems/gnu, labrea.stanford.edu,
  ftp.digex.net:/pub/gnu, ftp.kpc.com:/pub/mirror/gnu, f.ms.uky.edu:/pub3/gnu,
  jaguar.utah.edu:/gnustuff, ftp.hawaii.edu:/mirrors/gnu,
  vixen.cso.uiuc.edu:/gnu, mrcnext.cso.uiuc.edu:/pub/gnu,
  ftp.cs.columbia.edu:/archives/gnu/prep, col.hp.com:/mirrors/gnu,
  gatekeeper.dec.com:/pub/GNU, ftp.uu.net:/systems/gnu

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--- ../EC/handbook/$Id: README,v 1.9 1994/11/27 17:54:53 joke Rel $

**************
***  1994  ***
**************
  *  encore.ps.gz
        Joerg Heitkoetter. The Navigator's Guide to ENCORE.
        A non-technical report providing a gentle introduction
        to the various aspects of the EvolutioNary COmputation
        REpository network.

        Edition 1.8, October 1994. A4 paper size. ~50pp

  *  encore-US.ps.gz
        dito. US paper size.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/$Id: overview.id,v 1.1 1994/03/18 17:49:52 joke Exp $


                |-README
                |
                |                      |-README
                |                      |-cfsc.ps.gz
                |-docs-----------------|-cfscxv-0.1.readme.gz
                |                      |-fsw1.ps.gz
                |                      |-letseq1.ps.gz
                |-etc------------------
                |
     |-CFS-------|                      |-README
     |          |-papers---------------|-icsi92.ps.gz
     |          |                      |-lcs92-2.ps.gz
     |          |                      |-lcs92.ps.gz
     |          |
     |          |                      |-README
     |          |                      |-cfsc-1.02.tar.gz
     |          |-src------------------|-cfsc-1.98j.tar.gz
     |                                 |-cfscxv-0.1.tar.gz
     |                                 |-scsc-1.3j.tar.gz
     |-CONTENTS
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     |          |-README
     |          |-etc------------------
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|           |                      |-README
|           |                      |-agel92.ps.gz
|           |                      |-asim93.ps.gz
|           |-papers---------------|-kras91.ps.gz
|           |                      |-lee94.ps.gz
|           |                      |-moses91.ps.gz
|           |                      |-phys94.ps.gz
|-EA--------|                      |-zen93.ps.gz
|           |
|           |                                               |-README
|           |                                               |-lee.doc.gz
|           |                      |-LEE--------------------|-lee11exe.Mac.sh.gz
|           |                      |                        |-lee12.Mac.sh.gz
|           |-src------------------|                        |-lee12.Unix.sh.gz
|                                  |                        |-pinep.ps.gz
|                                  |-README
|                                  |
|                                  |-bugworld---------------|-README
|                                                           |-bugworld.tar.gz
|
|           |-README
|           |-etc------------------
|           |
|           |                      |-README
|-EP--------|-papers---------------|-cmplx94.ps.gz
|           |                      |-ep93.ps.gz
|           |                      |-fogel94.txt
|           |-src------------------
|
|           |-README
|           |-etc------------------
|           |
|           |                      |-README
|           |                      |-ecal92-2.ps.gz
|           |                      |-ep93.ps.gz
|-ES--------|-papers---------------|-ep94.ps.gz
|           |                      |-sys91-2.ps.gz
|           |                      |-sys93.ps.gz
|           |                      |-tai92.ps.gz
|           |
|           |                      |-LICE-1.02.tar.gz
|           |-src------------------|-README
|                                  |-SES-1.01.tar.gz
|
|-FAQ-------|-NEWS-2.3
|           |-NEWS-2.4
|           |-README
|           |
|           |                      |-EA-pipelines
|           |                      |-GA-and-robots
|           |                      |-GA-as-hardware
|           |                      |-GA-composer
|           |                      |-GA-vs-exhaustive
|           |                      |-GENEsYs-bug
|           |                      |-IlliGAL-news
|           |                      |-MIT-Press-offer
|           |                      |-Q20-predicto
|           |-fixes----------------|-SFI-address
|           |                      |-TSP-writeups.gz
|           |                      |-agents-at-cwru.gz
|           |                      |-alife-intro-texts.gz
|           |                      |-cmu-repository.gz
|           |                      |-goldberg-quote.gz
|           |                      |-hammingdist-code
|           |                      |-meaning-of-life.gz
|           |                      |-meaning-of-mind.gz
|           |                      |-real-genome-sizes.gz
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     |            |                      |-what-is-lamarckian.gz
     |            |-hhgtec-2.4.ps.gz
     |            |-hhgtec.ps.gz
     |            |-part1
     |            |-part2
     |            |-part3
     |            |-part4
     |            |-part5
     |            |-part6
     |            |
     |            |-supplements----------|-animal-comm
     |                                   |-nk-landscapes
     |                                   |-on-schema-theorem
     |                                   |-what-is-ep
     |
     |-GA--------|-README
     |            |
     |            |                      |-GAucsd-1.4.ps.gz
     |            |                      |-GENEsYs-1.0-doc.tar.gz
     |            |                      |-GenET.ps.gz
     |            |-docs-----------------|-README
     |            |                      |-gagsprog.ps.gz
     |            |                      |-tcga91-2.ps.gz
     |            |                      |-tolkien-doc.tar.gz
     |            |
     |            |-etc------------------|-README
     |            |                      |-sac94-suite.tar.gz
     |            |
     |            |-papers---------------|-README
     |            |                      |-ai93.ps.gz
     |            |                      |-canon94.ps.gz
     |            |                      |-csc94.ps.gz
     |            |                      |-csd-94-834.ps.gz
     |            |                      |-ecal92.ps.gz
     |            |                      |-icannga93.ps.gz
     |            |                      |-icga91-2.ps.gz
     |            |                      |-icga91.ps.gz
     |            |                      |-icga93-2.ps.gz
     |            |                      |-icga93.ps.gz
     |            |                      |-ieee94.ps.gz
     |            |                      |-ilmenau91.ps.gz
     |            |                      |-intro-greek.ps.gz
     |            |                      |-ki94.ps.gz
     |            |                      |-ml-dpe92.ps.gz
     |            |                      |-niche93.ps.gz
     |            |                      |-over93-2.ps.gz
     |            |                      |-over93.ps.gz
     |            |                      |-pogo94.ps.gz
     |            |                      |-ppsn92.ps.gz
     |            |                      |-sac94-2.ps.gz
     |            |                      |-sac94.ps.gz
     |            |                      |-tcga92.ps.gz
     |            |                      |-trees94.ps.gz
     |            |                      |-tutor93.ps.gz
     |            |
     |            |-src------------------|-GAGS-0.92.tar.gz
     |                                   |-GAME-2.1.tar.gz
     |                                   |-GAucsd-1.4.tar.gz
     |                                   |-GENEsYs-1.0.tar.gz
     |                                   |-GENITOR.tar.gz
     |                                   |-GenET.tar.gz
     |                                   |-README
     |                                   |-TOLKIEN.tar.gz
     |                                   |-dgenesis-1.0.tar.gz
|-EC-|                                   |-dougal.zip
     |                                   |-genesis-5.0.tar.gz
     |                                   |-genetic2.tar.gz
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|                                 |-genetic2n.tar.gz
|                                 |-genocop2.tar.gz
|                                 |-libga-1.0.tar.gz
|                                 |-paragenesis.tar.gz
|                                 |-pga-2.7.tar.gz
|                                 |-sga-c.tar.gz
|                                 |-sga-cube.tar.gz
|                                 |-sga-f.tar.gz
|                                 |-sga-p.tar.gz
|
|           |-FAQ-----------------|-README
|           |                     |-gp-faq.txt.gz
|           |-README
|           |
|           |-docs----------------|-GPEISTDoc.ps.gz
|           |                     |-README
|           |-etc-----------------
|           |
|           |-papers--------------|-README
|           |                     |-pedes93.ps.gz
|           |
|-GP--------|                     |-GPEIST4.tar.gz
|           |                     |-README
|           |                     |-gpcpp4.tar.gz
|           |                     |-gpcpp4.zip
|           |-src-----------------|-gpquick-2.1.tar.gz
|                                 |-gpsteps.zip
|                                 |-imogenes.zip
|                                 |-koza.gp.gz
|                                 |-sgpc-1.1.tar.gz
|-OVERVIEW
|-README
|-RESOURCES
|
|           |-README
|           |-aaai95.cfp.gz
|           |-ai-genealogy.prj.gz
|           |-aieng95.cfp.gz
|           |-aisb95.cfp.gz
|           |-cad95.cfp.gz
|           |-cell95.cfp.gz
|           |-cifer95.cfp.gz
|           |-eama95.cfp.gz
|           |-ecal95.cfp.gz
|           |-ecml95.cfp.gz
|           |-ep95-award.info.gz
|           |-ep95.cfp.gz
|           |-es94.book.gz
|           |-flairs95.cfp.gz
|-cfp-------|-galesia95.cfp.gz
|           |-gwics95.cfp.gz
|           |-icec95.cfp.gz
|           |-icga95.cfp.gz
|           |-icsc95.cfp.gz
|           |-ida95.cfp.gz
|           |-ijcai95.cfp.gz
|           |-inbs95.cfp.gz
|           |-informatica95.cfp.gz
|           |-ispe95.cfp.gz
|           |-ml95.cfp.gz
|           |-model95.cfp.gz
|           |-nwga95.cfp.gz
|           |-petro95.cfp.gz
|           |-sac95.cfp.gz
|           |-soco95.cfp.gz
|
|           |-README
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|           |-caltech
|           |-capetown
|           |-dortmund
|-eclairs---|-eunet
|           |-hongkong
|           |-michigan
|           |-santafe
|           |-warwick
|           |-wayne
|
|           |-README
|           |
|           |                      |-TSP--------------------|-README
|           |                      |                        |-tsplib-1.2.tar.gz
|           |                      |
|           |                      |-netlib-----------------|-README
|           |                      |
|           |                      |-orlib------------------|-README
|           |-data-----------------|                        |-info.txt.gz
|           |                      |
|           |                      |                        |-README
|           |                      |-softlib----------------|-catalogue
|           |                      |                        |-index
|           |                      |
|           |                      |-zero-one---------------|-README
|           |                                               |-sac94-suite.tar.gz
|           |
|           |-fun------------------|-genome.c
|           |
|-etc-------|-gif------------------|-ajoke.gif
|           |                      |-encore.gif
|           |
|           |                      |-gauntlet.html
|           |-html-----------------|-gauntlet_toc.html
|           |                      |-red.html
|           |                      |-red_toc.html
|           |
|           |                      |-TSP-contest
|           |-problems-------------|-hollands-quest
|           |                      |-multi.tst
|           |
|           |                      |-a4-fix.ps
|           |-ps-------------------|-logo.ps
|                                  |-overview.ps
|                                  |-sections.ps
|
|           |-README
|-handbook--|-encore-US.ps.gz
|           |-encore.ps.gz
|
|           |-README
|           |-aifb-karlsruhe.phd
|           |-berlin.fellowship
|           |-gatech.postdoc
|           |-glasgow.scholarships
|           |-kaist.postdoc
|-jobs------|-london.phd
|           |-oscar.project
|           |-santafe.postdoc
|           |-swiss-ai-ml.director
|           |-swiss-ai.phd
|           |-ucr.faculty
|           |-zpr-koeln.phd
|
|           |-2500GArefs.ps.gz
|           |-README
|           |-cogann.bib.gz
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     |           |-ea-app.ps.gz
     |-refs------|-ec-ref.bib.gz
     |           |-ec-ref.ps.gz
     |           |-fracimg-ref.gz
     |           |-fuzzy.bib.gz
     |           |-gp-ref.gz
     |
     |           |-README
     |           |
     |           |                       |-README
     |           |                       |-fang-msc.ps.gz
     |           |-masters---------------|-maresky-msc.info.gz
     |           |                       |-maresky-msc.ps.gz
     |           |                       |-ruhland-dipl.info.gz
     |           |
     |-thesis----|                       |-README
                 |                       |-kalyanmoy-phd.info.gz
                 |                       |-levine-phd.info.gz
                 |-phd-------------------|-levine-phd.ps.gz
                                         |-palmer-phd.info.gz
                                         |-palmer-phd.ps.gz
                                         |-tackett-phd.info.gz
                                         |-tackett-phd.tar.gz
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-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
```

-- $Id: RESOURCES,v 1.9 1994/11/27 17:54:54 joke Rel $

  * RESOURCES NEEDED?

Besides 25MB (>80MB uncompressed) disk space you'll need Larry Wall's perl(1) language being installed on your system; the mirror software is actually a collection of perl scripts.

  * MAN POWER?

EClairs run automatically; there's the mirror software, and an entry in the .crontab file of the local maintainer. Hence the mirror is activated as specified by the crontab interval, and after execution of the script e-mail is sent to the local maintainer containing the logfile of the session for notification; only when something went wrong, you'll need to check the archive; that's all.

  * HOW TO SET-UP?

I'll provide you with a complete systems set-up; i.e. mirror & config files as soon as I know the name of your FTP server (and it's IP address) and the directory the "EC/" folder gets into. Then I create a new banner for this EClair (cf ENCORE:/eclairs), and update the set-up files according to your needs.

At some EClairs, I have a shell account (user: joke/group: encore) and do the the set-up; but this is usually at places where I also do other work (SFI, CalTech); at other places, I usually suggest to create a user: encore/group: encore with ~encore/.crontab holding the mirror information. Then a local guru (you?) can watch over this user's activities; and read the e-mail logfiles as time permits.

```
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
```

--- ../EC/FAQ/$Id: README,v 1.9 1994/11/27 17:54:55 joke Rel $

This folder contains a USENET posting entitled:

"The Hitch-Hiker's Guide to Evolutionary Computation"

that is currently edited by David Beasley <David.Beasley@cm.cf.ac.uk>

The FAQ is posted (in 6 pieces) quarterly, usually on 20th, to the newsgroup "comp.ai.genetic"; it's also available in this ASCII format from the FAQ server at MIT, as shown below.

It's the definitive guide to resources concerning the field of EC, and the "evolutionary part" of Artificial Life. But please BE WARNED, the style used to present all this otherwise tremendously "dry stuff" is intended to be satirical, and thus should not be read if you'd prefer a *scientific* introduction to the field.

The FAQ project is considered to be a layman's (aka students) introduction to EC, and (possibly) to give pointers to most EC resources that are currently available.

Between posting it's available in its ASCII form. (from part 2 of the FAQ):

```
[..]
  Here is an example of how to send for a document on  the  archive  at
  rtfm.mit.edu.  This example will return a list of all the FAQs stored
  in the directory pub/usenet/news.answers/, and a copy of this  guide.
  Send the following message (leaving the "Subject: line" blank) to
  <mail-server@rtfm.mit.edu> :

       send usenet/news.answers/index
       send usenet/news.answers/ai-faq/genetic/part1
       send usenet/news.answers/ai-faq/genetic/part2
       send usenet/news.answers/ai-faq/genetic/part3
       send usenet/news.answers/ai-faq/genetic/part4
       send usenet/news.answers/ai-faq/genetic/part5
       send usenet/news.answers/ai-faq/genetic/part6
       quit
[..]
```

Or consider browsing the PostScript version, which we recommend.

NOTE: the directory labled "fixes" contains additions/corrections to the current issue of the HHGTEC. This is for cases when new material/additions etc. appear in-between the quarterly issues. The directory "supplements" contains elaborate versions of FAQ sections, that have been replaced by more concise versions in the posted version, due to restrictions in length (i.e., size in kilobytes) of articles posted to Usenet.

```
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/EA/$Id: README,v 1.9 1994/11/27 17:54:56 joke Rel $
```

This directory contains the general Evolutionary Algorithm section of ENCORE; it's currently under construction.

```
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/EA/papers/$Id: README,v 1.9 1994/11/27 17:54:56 joke Rel $
```

```
**************
***  1991  ***
**************
  *  kras91.ps.gz
       Thomas B\"ack and Frank Hoffmeister. Global Optimization by
       Means of Evolutionary Algorithms. In Antamoshkin [Ant91],
       pages 17-21.

       [Ant91] Alexander N. Antamoshkin, editor. Random Search as a Method
       for Adaptation and Optimization of Complex Systems, Divnogorsk,
       USSR, March 1991. Krasnoyarsk, Space Technology University.

  *  moses91.ps.gz
       Thomas B\"ack and Frank Hoffmeister. Adaptive Search by Evolutionary
       Algorithms. In Ebeling et al. [EPW91], pages 156-163.

       [EPW91] W. Ebeling, M. Peschel, and W. Weidlich, editors.
       Models of Selforganization in Complex Systems (MOSES),
       volume 64 of Mathematical Research. Akademie-Verlag, Berlin, 1991.

**************
***  1992  ***
**************
  *  agel92.ps.gz
       Thomas B\"ack and Hans-Paul Schwefel. Evolutionary Algorithms: Some
       Very Old Strategies for Optimization and Adaptation. In Perret-Gallix
       [PG92], pages 247-254.

       [PG92] D. Perret-Gallix, editor. New Computing Techniques in Physics
       Research II. Proceedings 2nd Internatinal Workshop on Software
       Engineering, Artificial Intelligence and Expert Systems for High
       Energy and Nuclear Physics, La Londe-Les-Maures, France, January
       13-18 1992. World Scientific, Singapore, 1992.

  *  ki92.ps.gz
       H-P Schwefel und Thomas B\"ack. K\"unstliche Evolution -- eine
       intelligente Probleml\"osungsstrategie? (ki 1992)

**************
***  1993  ***
**************
  *  asim93.ps.gz
       Thomas B\"ack, U. Hammel und H.-P. Schwefel. Modelloptimierung mit
       evolution\"aren Algorithmen. In A. Sydow, editor, Simulationstechnik:
       8. Symposium in Berlin, Fortschritte in der Simulationstechnik,
       pages 49-57. Vieweg, Wiesbaden, 1993. (Note: paper in German)

  *  zen93.ps.gz
       Thomas S. Ray. An evolutionary approach to synthetic biology,
       Zen and the art of creating life.

**************
***  1994  ***
**************
  *  lee94.ps.gz
       Filippo Menczer and Richard K. Belew. Latent Energy Environments.
       See ../EC/EA/src/LEE for more.

  *  phys94.ps.gz
       G. Rudolph und H-P Schwefel. Evolution\"are Algorithmen -- ein
       robustes Optimierungskonzept. (Phys. Bl. 50 (1994) Nr.3)

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
```

```
--- ../EC/EA/src/$Id: README,v 1.9 1994/11/27 17:54:57 joke Rel $

    This directory contains Evolutionary Algorithm implementations that do
not fit into the more specialized sections. E.g., the LEE (Latent Energy
Environments) by F. Menczer and R.K. Belew; which is an Alife model that
also includes an EC paradigm, i.e., a Genetic Algorithm in this case.

**************
***  1994  ***
**************
  *  LEE/       Latent Energy Environments by F. Menczer and R.K. Belew
        Cognitive Computer Science Research Group, UCSD

  *  bugworld/  BugWorld is a simple introduction to the world of Genetic
        Algorithms (GAs). A virtual physical environment is created
        within the computer, which is then populated by various
        creatures, or "bugs", composed entirely of machine
        instructions (cf. Tierra).
        BUGWORLD (c) 1993 by Martyn Amos, Parallel Computation Group
        Department of Computer Science, University of Warwick,
        COVENTRY United Kingdom, CV4 7AL, martyn@dcs.warwick.ac.uk

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/ES/$Id: README,v 1.9 1994/11/27 17:54:58 joke Rel $

    This directory contains the Evolution Strategies section of ENCORE;
it's currently under construction.

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/ES/papers/$Id: README,v 1.9 1994/11/27 17:54:58 joke Rel $

**************
***  1991  ***
**************
  *  sys91-2.ps.gz
        Frank Hoffmeister, Thomas B\"ack. Genetic Algortihms and Evolution
        Strategies: Similarities and Differences. Technical Report SyS-91/2,
        Systems Analysis Research Group, LSXI, Dept. of Computer Science,
        University of Dortmund. (Note: this file cannot be viewed using
        GhostScript or GhostView previewers; but *prints out* ok.)

  *  icga91-2.ps.gz
        Thomas B\"ack and Frank Hoffmeister. Extended Selection Mechanisms
        in Genetic Algorithms. In Belew and Booker [BB91], pages 92-99.

        [BB91]  Richard K. Belew and Lashon B. Booker, editors.
        Proceedings of the 4th International Conference on Genetic Algorithms
        and their Applications, San Mateo, CA, 1991. University of California,
        San Diego, USA, Morgan Kaufmann Publishers.

**************
***  1992  ***
**************
  *  tai92.ps.gz
        Frank Kursawe (1992) Evolution strategies for vector optimization",
        Taipei, National Chiao Tung University,  187-193.

**************
***  1993  ***
```

```
**************
  *  ep93.ps.gz
        Thomas B\"ack, G\"unter Rudolph, and Hans-Paul Schwefel (1993)
        Evolutionary Programming and Evolution Strategies: Similarities and
        Differences. In Fogel and Atmar [FA93].

        [FA93] David B. Fogel and Wirt Atmar, editors. Proceedings of the 2nd
        Annual Conference on Evolutionary Programming, San Diego, CA,
        February 25-26, 1993. Evolutionary Programming Society.

  *  sys93.ps.gz
        Thomas B\"ack, Hans-Paul Schwefel (1993) An overview of evolutionary
        parameter optimization.

**************
***  1994  ***
**************
  *  ep94.ps.gz
        Joachim Sprave (1994) Linear Neighbourhood Evolution Strategy.
        In Fogel and Atmar [FA94].

        [FA94] David B. Fogel and Wirt Atmar, editors. Proceedings of the 3rd
        Annual Conference on Evolutionary Programming, San Diego, CA, 1994.
        Evolutionary Programming Society.

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/ES/src/$Id: README,v 1.9 1994/11/27 17:54:59 joke Rel $

**************
***  1994  ***
**************
  *  LICE-1.02.tar.gz

        Joachim Sprave <joe@LS11.informatik.uni-dortmund.de>
        LICE is a parameter optimization program based on Evolution
        Strategies. In contrast to classic ES, LICE has a local selection
        scheme to prevent premature stagnation. Details and results have
        been presented at the EP'94 conference in San Diego.

  *  SES-1.01.tar.gz

        Joachim Sprave <joe@LS11.informatik.uni-dortmund.de>
        SES (Simple Evolution Strategy) is a parameter optimization program
        based on Evolution Strategies (ES).  It is a more or less
        traditional ES implementation, except for:

        - correlated mutations not implemented
        - global recombination not implemented
        - geometric intermediate recombination added for variances sigma[i]
        - discrete recombination on both parameters and variances is performed
          simultaneously, i.e. sigma[i] and x[i] are taken from one parent
          at each position i.

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/GA/$Id: README,v 1.9 1994/11/27 17:55:00 joke Rel $

    This directory contains the Genetic Algorithms section of ENCORE;
it's currently under construction.
```

```
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/GA/papers/$Id: README,v 1.9 1994/11/27 17:55:00 joke Rel $

**************
***  1991  ***
**************
  *  icga91.ps.gz
        Thomas B\"ack, Frank Hoffmeister, and Hans-Paul Schwefel. A Survey
        of Evolution Strategies. In Belew and Booker [BB91], pages 2-9.

  *  ilmenau91.ps.gz
        Thomas B\"ack. Optimization by Means of Genetic Algorithms.
        In K\"ohler [K\"oh91], pages 163-169.

        [K\"oh91] Eberhart K\"ohler, editor.
        36. Internationales wissenschaftliches Kolloquium, Ilmenau, October
        1991. Technische Universit\"at Ilmenau.

**************
***  1992  ***
**************
  *  ecal92.ps.gz
        Thomas B\"ack. Self-Adaptation in Genetic Algorithms. In Proceedings
        of the 1st European Conference on Artificial Life, December 11-13,
        1991, pages 263-271, Paris, France, 1992. MIT Press.

  *  ecal92-2.ps.gz
        Frank Hoffmeister and Thomas B\"ack. Genetic Self-Learning.
        In Proceedings of the 1st European Conference on Artificial Life,
        December 11-13, 1991, pages 227-235, Paris, France, 1992. MIT Press.

  *  ppsn92.ps.gz
        Thomas B\"ack. The Interaction of Mutation Rate, Selection, and
        Self-Adaptation Within a Genetic Algorithm. In M\"anner and Manderick
        [MM92], pages 85-94.

        [MM92] Reinhard M\"anner and Bernard Manderick, editors. Parallel
        Problem Solving from Nature 2. Elsevier Science Publishers, Amsterdam,
        1992.

  *  tcga92.ps.gz
        Robert E. Smith. Papers available from TCGA.

  *  ml-dpe92.ps.gz
        Nici Schraudolph and Rick Belew. Dynamic Parameter Encoding in
        Genetic Algorithms. UCSD TR CS-90-175. Revised version that appeared
        in Machine Learning, 1992.

**************
***  1993  ***
**************
  *  ai93.ps.gz
        Alberto Bertoni and Marco Dorigo. Implicit Parallelism in Genetic
        Algorithms. ICSI TR-93-001.

  *  ftp://ftp.santafe.edu/pub/Users/mm/ga-hillclimb.ps.Z
        Melanie Mitchell and John H. Holland. When will a Genetic Algorithm
        outperform Hillclimbing? (SFI working paper)

  *  icannga93.ps.gz
        Martin Mandischer. Representation and Evolution of Neural Networks,
        pp. 643--649, In: R.F. Albrecht and C.R. Reeves and N.C. Steele,
        Artificial Neural Nets and Genetic Algorithm Proceedings of the
```

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        International Conference at Innsbruck, Austria, Springer, Wien and
        New York, ISBN 3-211-82459-6, 1993.

   *  icga93.ps.gz
        Thomas B\"ack. Optimal mutation rates in genetic search.
        In S. Forrest, editor, Proceedings of the Fifth International
        Conference on Genetic Algorithms, pages 2-9. Morgan Kaufmann,
        San Mateo, CA, 1993.

   *  icga93-2.ps.gz
        Hsiao-Lan Fang, Peter Ross, Dave Corne. A Promising Genetic Algorithm
        Approach to Job-Shop Scheduling, Rescheduling, and Open-Shop Scheduling
        Problems", in Proceedings of the Fifth International Conference on
        Genetic Algorithms, S. Forrest (ed), San Mateo: Morgan Kaufmann,
        375-382, 1993.

   *  ftp://ftp.santafe.edu/pub/Users/mm/sfi-93-11-072.ps.Z
        Melanie Mitchell, Stephanie Forrest. Genetic Algorithms and
        Artificial Life. (SFI working paper 93-11-072)

   *  tutor93.ps.gz
        Darrel Whitley. A Genetic Algorithm Tutorial. Technical
        Report CS-93-103, March 10, 1993. Colorado State University.
        Published as: D. Whitley. A genetic algorithm tutorial.
        Statistics and Computing (1994) 4: 65-85.

   *  over93.ps.gz
        David Beasley, David R. Bull, Ralph R. Martin. An Overview
        of Genetic Algortihms: Part 1, Fundamentals
        University Computing, 15(2) 58-69, 1993.
        [Suitable for beginners. Describes all the basic principles, and
        includes a comparison with other search methods.  49 references.]

   *  over93-2.ps.gz
        David Beasley, David R. Bull, Ralph R. Martin. An Overview
        of Genetic Algortihms: Part 2, Research Topics
        University Computing, 15(4) 170-181, 1993.
        [Suitable for beginners and intermediates. Includes sections on
        crossover, reordering, epistasis, deception, naive evolution,
        non-binary representations, dynamic operator probabilities, niching,
        diploidy, and heuristics. 70 references.]

   *  niche93.ps.gz
        David Beasley, David R. Bull, Ralph R. Martin. A Sequential Niche
        Technique for Multimodal Function Optimization
        Evolutionary Computation, 1(2) 101-125, 1993.
        [Describes a technique for locating all optima of a multimodal
        function. Involves repeatedly running a GA, each time locating one
        optimum, then "cancelling it out" of the fitness function before
        the next run. Describes measurement of GA performance statistics.]

**************
***  1994  ***
**************
   *  sac94.ps.gz
        Sami Khuri, Thomas B\"ack, and J\"org Heik\"otter.
        The Zero/One Multiple Knapsack Problem and Genetic Algorithms.
        In Proceedings of the 1994 ACM Symposium on Applied Computing
        (SAC'94), 188--193. March 1994, Phoenix AZ, ACM
        Press, 1994. Genetic Algorithms and Optimization Track.

   *  sac94-2.ps.gz
        Sami Khuri.
        Walsh and Haar Functions in Genetic Algorithms.
        In Proceedings of the 1994 ACM Symposium on Applied Computing
        (SAC'94). March 1994, Phoenix AZ, ACM Press, 1994. Genetic
        Algorithms and Optimization Track.
```

```
  * csc94.ps.gz
       Sami Khuri, Thomas B\"ack, and J\"org Heitk\"otter.
       An Evolutionary Approach to Combinatorial Optimization
       Problems. In Proceedings of the 1994 Computer Science
       Conference (CSC'94), 66--73. March 1994, Phoenix AZ,
       ACM Press, 1994.

  * csd94-834.ps.gz
       Ari Juels and Martin Wattenberg. Stachastic Hillclimbing as a
       Baseline Method for Evaluating Genetic Algorithms. Technical
       Report, UC Berkeley, ftp://tr-ftp.cs.berkeley.edu/pub/tech-reports/
       csd/csd-94-834/csd-94-834.ps (relates to csc94.ps.gz !)

  * ieee94.ps.gz
       J.R. Filho, C. Alippi and P. Treleaven.
       Genetic Algorithm Programming Environments, to appear in
       IEEE Computer in the February/1994.
       ftp://bells.cs.ucl.ac.uk/papagena/game/docs/gasurvey.ps

  * pogo94.ps.gz
       Paul Fielding. Walsh and Partition Functions Made Easy.
       Presented as a poster at the 1994 AISB Workshop on Evolutionary
       Computing.

  * trees94.ps.gz
       Charles C. Palmer and Aaron Kershenbaum. Representing Trees in
       Genetic Algorithms. Presented at WCCI 1994.

  * canon94.ps.gz
       G. Rudolph. Convergence Analysis of Canonical Genetic Algorithms.
       IEEE Trans. on Neural Networks, special issue on EP, 1994.

  * ki94.ps.gz
       Sami Khuri and Thomas B\"ack. An Evolutionary Heuristic for the
       Maximum Vertex Cover Problem. Presented at KI94.

  * intro-greek94.ps.gz
       Spyros Kazarlis. Introduction to Genetic Algorithms. (In Greek
       language!) Aristotele University of Thesaloniki, Faculty of
       Engineering, Dept. of EE.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/GA/src/$Id: README,v 1.9 1994/11/27 17:55:01 joke Rel $

**************
***  1992  ***
**************
  * GAucsd14.tar.gz    (cf FAQ A.20)
       Nicol N. Schraudolph <nici@salk.edu>
       See also ../EC/GA/docs/GAucsd14.ps.gz
       The technical report on Dynamic Parameter Encoding has been published
       in the journal "Machine Learning", volume 9, pages 9-21, 1992.

  * GENITOR.tar.gz     (cf FAQ A.20)
       Darrel L. Whitley <whitley@CS.ColoState.EDU>

  * genocop2.tar.gz
  * genetic2.tar.gz
  * genetic2n.tar.gz   (cf FAQ A.20)
       Zbigniew Michalewicz <zbyszek@mosaic.uncc.edu>

  * genesis-5.0.tar.gz (cf FAQ A.20)
```

```
        John Grefenstette <gref@aic.nrl.navy.mil>

   *  paragenesis.tar.gz (cf FAQ A.20)
        Michael van Lent <vanlent@cs.utk.edu>

**************
***  1993  ***
**************
   *  GAME-2.1.tar.gz    (cf FAQ A.20)
        Jose Luiz Ribeiro Filho <zeluiz@cs.ucl.ac.uk>

   *  GenET.tar.gz       (cf FAQ A.20)
        Cezary Z. Janikow <janikow@radom.umsl.ed

   *  libga-1.0.tar.gz   (cf FAQ A.20)
        Art Corcoran <corcoran@penguin.mcs.utulsa.edu>

   *  sga-f.tar.gz
        Ulrich Hermes <hermes@ls11.informatik.uni-dortmund.de>
        Goldberg's Simple Genetic Algorithm (enhanced) in FORTRAN-77.

   *  sga-p.tar.gz
        Mark Juric <mjuric@aisun4.ai.uga.edu> (sga.pas: Turbo Pascal)
        Joerg Heitkoetter <joke@Germany.EU.net> (sga.p: Sun Pascal)
        Goldberg's Simple Genetic Algorithm, in Turbo & Sun Pascal.

   *  sga-cube.tar.gz
   *  sga-c.tar.gz       (cf FAQ A.20)
        Robert E. Smith, David E. Goldberg, Jeff A. Earickson.
        SGA-C: A C-language Implementation of a Simple Genetic Algorithm
        See also ../EC/GA/docs/tcga91-2.ps.gz

**************
***  1994  ***
**************
   *  dgenesis-1.0.tar.gz (cf FAQ A.20)
        Erick Cantu Paz <ecantu@lamport.rhon.itam.mx>

   *  pga-2.7.tar.gz     (cf FAQ A.20)
        Peter Ross <peter@aisb.ed.ac.uk>

   *  GACS-0.92.tar.gz   (cf FAQ A.20)
        J.J. Merelo Guervos <jmerelo@kal-el.ugr.es>

        GAGS (Genetic Algorithms from Granada, Spain) is a Genetic
        Algorithm application generator and class library written mainly in
        C++.

        *As a class library, and among other thing, GAGS includes:
        -A _"chromosome" hierarchy_ with variable length chromosomes.
        -_Genetic operators_: 2-point crossover, uniform crossover,
        bit-flip mutation, transposition (gene interchange between 2
        parts of the chromosome), and variable-length operators: duplication,
        elimination, and random addition.
        -_Population level operators_ include steady state, roulette
        wheel and tournament selection.
        -_Gnuplot wrapper_: turns gnuplot into a iostreams-like class.
        -Easy sample file loading and configuration file parsing.

        *As an application generator (written in PERL), you only need to supply
        it with an ANSI-C or C++ fitness function, and it creates a C++
        program that uses the above library to 90% capacity, compiles it, and
        runs it, saving results and presenting fitness thru gnuplot.

   *  TOLKIEN.tar.gz
        Anthony Yiu-Cheung Tang <tang028@cs.cuhk.hk>
        Toolkit for genetics-based applications in C++.
```

```
  *  dougal.zip         (cf FAQ A.20)
        Brett Parker, 7 Glencourse, East Boldon, Tyne + Wear,
        NE36 0LW, England. E-mail: <b.s.parker@durham.ac.uk>

        DOUGAL is a demonstration program for solving the Travelling
        Salesman problem using GAs.  The system guides the user
        through genetic algorithms, allowing them to see the results of
        altering parameters relating to CROSSOVER, MUTATION etc.
        The system demonstrates graphicaly the OPTIMIZATION of the route.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/GA/docs/$Id: README,v 1.9 1994/11/27 17:55:02 joke Rel $

**************
***  1991  ***
**************
  *  tcga91-2.ps.gz
        Robert E. Smith, David E. Goldberg, Jeff A. Earickson.
        SGA-C: A C-language Implementation of a Simple Genetic Algorithm
        TCGA Report No. 91002. The Clearinghouse for Genetic Algorithms
        The University of Alabama, Department of Engineering Mechanics
        Tuscaloosa, AL 35487.

**************
***  1992  ***
**************
  *  GENEsYs-1.0-doc.tar.gz
        Thomas B\"ack. The GENEsYs documentation.
        See also ../EC/GA/src/GENEsYs-1.0.tar.gz

  *  GAucsd-1.4.ps.gz
        Nicol N. Schraudolph. The GAucsd 1.4 User's Guide in PS.
        See also ../EC/GA/src/GAucsd-1.4.tar.gz

**************
***  1993  ***
**************
  *  GenET.ps.gz
        Cezary Z. Janikow. The GenET User's Manual.
        See also ../EC/GA/src/GenET.tar.gz

**************
***  1994  ***
**************
  *  gagsprog.ps.gz
        JJ Merolo Guervos. libGAGS programmer's manual.
        See also ../EC/GA/src/gags-0.92.tar.gz

  *  tolkien-doc.tar.gz
        Anthony Yiu-Cheung Tang. All parts of the Tolkien user's guide;
        including a GA and a CFS C++ construction primer.
        See also ../EC/GA/src/TOLKIEN.tar.gz

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/GA/etc/$Id: README,v 1.9 1994/11/27 17:55:02 joke Rel $

**************
***  1993  ***
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**************
  *  sac94-suite.tar.gz

This directory contains a collection of 0/1 Multiple Knapsack Problems,
that are well known from LITERATURE, and heuristically solved in the
following publications:

Tabu Search:
  F. Dammeyer and S. Voss (1991) "Dynamic tabu list management using
    the reverse elimination method."
    Annals of Operations Research.

Simulated Annealing:
  A. Drexel (1988) "A Simulated Annealing Approach to the Multiconstraint
    Zero-One Knapsack Problem."
    Computing, 40:1-8.

Genetic Algorithms:
  S. Khuri, T. Baeck, J. Heitkoetter, (1994) "The Zero/One Multiple
    Knapsack Problem and Genetic Algorithms", 188-193, in the 1994
    ACM Symposium on Applied Computing, SAC'94, Phoenix, Arizona.
    See also: ../EC/GA/papers/sac94.ps.gz

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LITERATURE
  C.C. Petersen (1967) "Computational experience with variants of the
    balas algorithm applied to the selection of R&D projects."
    Management Science, 13:736-750. [PET*.DAT]

  S. Senyu and Y. Toyada (1967) "An apparoach to linear programming
    with 0-1 variables."
    Management Science, 15:B196-B207. [SENTO*.DAT]

  H.M. Weingartner and D.N. Ness (1967) "Methods for the solution of
    the multi-dimensional 0/1 knapsack problem."
    Operations Research, 15:83-103. [WEING*.DAT]

  W. Shi (1979) "A branch and bound method for the multiconstraint
    zero one knapsack problem."
    J. Opl. Res. Soc., 30:369-378. [WEISH*.DAT]

  A. Freville and G. Plateau (1990) "Hard 0-1 multiknapsack testproblems
    for size reduction methods."
    Investigation Operativa, 1:251-270. [PB*.DAT, HP*.DAT]

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/CFS/$Id: README,v 1.9 1994/11/27 17:55:03 joke Rel $

    This directory contains the Learning Classifier Systems section of
ENCORE; it's currently under construction.

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/CFS/papers/$Id: README,v 1.9 1994/11/27 17:55:04 joke Rel $

**************
***  1992  ***
**************
  *  icsi92.ps.gz
```

```
        Marco Dorigo. Genetic and Non Genetic Operators in ALECSYS.
        (ICSI TR 92-075)

  *  lcs92.ps.gz
        Robert E. Smith. A report on the 1st International Workshop on
        Learning Classifier Systems, November 1992.

  *  lcs92-2.ps.gz
        David E. Goldberg, Jeffrey Horn, Klayanmoy Deb.
        What Makes a Problem Hard for a Classifier System?
        Long Abstract presented at the 1st International Workshop on
        Learning Classifier Systems, May 1992. (IlliGAL Report 92007)

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/CFS/src/$Id: README,v 1.9 1994/11/27 17:55:05 joke Rel $

**************
***  1993  ***
**************
  *  cfsc-1.02j.tar.gz          (cf FAQ Q.20)
        Rick Riolo's CFS-C original.
        Contact: <rlr@merit.edu>

  *  cfsc-1.98j.tar.gz          (cf FAQ Q.20)
        Rick Riolo's CFS-C package in "ANSIfied"/unixoid version.
        Contact: <joke@Germany.EU.net>

**************
***  1994  ***
**************
  *  cfscxv-0.1.tar.gz          (cf FAQ Q.20)
        CFSC XV 0.1 is a bug fix - version of cfsc1.98j with some
        extensions. cfsc1.98j contains several bugs which, however,
        won't appear on several systems due to the byte order,
        memory allocation mechanisms or whatever.
        (cf ../EC/CFS/docs/cfscxv-0.1.readme.gz)
        [NB: you should use this version instead of my 1.98 one!   -joke]

  *  scsc-1.3j.tar.gz           (cf FAQ Q.20)
        A C translation of Goldberg's Pascal SCS program. Taken from
        Appendix D of Goldberg, D.E. "Genetic Algorithms in Search,
        Optimization and Machine Learning", Addison-Wesley, Boston, MA, 1989.
        Pre-1.3 versions contain serious bugs; contact: <joke@Germany.EU.net>

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/CFS/docs/$Id: README,v 1.9 1994/11/27 17:55:05 joke Rel $

**************
***  1989  ***
**************
  *  fsw1.ps.gz
        Rick Riolo's paper on Finite State World 1 implemented using
        CFS-C.

  *  letseq1.ps.gz
        Rick Riolo's paper on Letter Sequence predictor 1 implemented using
        CFS-C.

  *  cfsc.ps.gz
```

```
        Rick Riolo's CFS-C Programmer's Manual.
        See also: ../EC/CFS/src/cfsc-1.02.tar.gz

**************
***  1994  ***
**************
  *  cfscxv-0.1.readme.gz
        Jens Engels elaboration of cfsc-1.98j;
        [better use THIS one!   -joke]

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/GP/$Id: README,v 1.9 1994/11/27 17:55:06 joke Rel $

    This directory contains the Genetic Programming section of ENCORE;
it's currently under construction.

An excellent FAQ (List of Frequently Asked Questions) devoted to Genetic
Programming, and edited by James Rice <Rice@KSL.Stanford.Edu>
is avail. as: ../EC/GP/FAQ/gp-faq.txt.gz

It it regularly posted to the GP community's mailing list (cf FAQ)

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/GP/FAQ/$Id: README,v 1.9 1994/11/27 17:55:07 joke Rel $

**************
***  1993  ***
**************
  *  gp-faq.txt.gz
        The Genetic Programming FAQ edited by James Rice.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

--- ../EC/GP/src/$Id: README,v 1.9 1994/11/27 17:55:07 joke Rel $

**************
***  1993  ***
**************
  *  koza.gp.gz (cf FAQ A.10.2)
        Examples from:

        Koza, J.R. (1992), "Genetic Programming: On the Programming of
        Computers by means of Natural Selection", Cambridge, MA: MIT Press.

  *  sgpc-1.1.tar.gz
        SGPC: Simple GENETIC PROGRAMMING in C by Walter Alden Tackett and
        Aviram Carmi <gpc@ipld01.hac.com>

  *  gpquick-1.2.tar.gz
        GPQUICK is a simple Genetic Programming system in C++ by
        Andrew Singleton <p00396@psilink.com>
        It includes documentation from the associated magazine article
        (BYTE, "Some Assembly Required", February 1994).

        GPQUICK is also available as:
          ftp.cc.utexas.edu:/pub/genetic-programming/code/gpquick-1.2.tar.gz
```

```
          ftp.cc.utexas.edu:/pub/genetic-programming/code/gpquick-1.2.zip

**************
***  1994  ***
**************
  *  gpcplus4.zip
        A DOS implementation of a GP system written in C++. The
        code is completely ANSI compatible. Ramped half and half and
        tournament selection are implemented along with standard GP
        components. Project and make files are also included.
        A Santa Fe trail module is included which works!!!

  *  gpcplus4.tar.gz
        The UNIX implementation of the above program which
        works when compiled under GNU included is a Makefile and
        SF trail. Submitted by Adam Fraser <A.Fraser@eee.salford.ac.uk>

  *  imogene.zip
        Imogene is a Windows 3.1 shareware program which generates pretty
        images using genetic programming.  The program displays generations of
        9 images, each generated using a formula applied to each pixel.  (The
        formulae are initially randomly computed).  You can then select those
        images you prefer.  In the next generation, the nine images are
        generated by combining and mutating the formulae for the most-
        preferred images in the previous generation. Imogene is based on
        work originally done by Karl Sims at (then) Thinking Machines
        for the CM-2 massively parallel computer - but you can use it on
        your PC. Submitted by Harley Davis <davis@ilog.fr>

  * GPEIST4.tar.gz
        Contains the Genetic Programming Environment in
        Smalltalk (GPEIST). GPEIST is implemented in VisualWorks
        (Smalltalk 80). GPEIST provides a framework for implementing
        and monitoring GP experiments. The Ant Trail Problem has
        been encoded as an example. GPEIST provides population,
        fittest program, report and chart browsers. An animation
        browser is provided for the Ant Trail Problem.
        Submitted by Tony White <arpw@bnr.ca>
        (cf ../docs/GPEISTDoc.ps.gz)

  *  gpsteps.zip
        GPSTEPS (Genetic Programming SmallTalk Easy Prototyping
        System) is a system for Genetic Programming implemented in
        Digitalk Smalltalk.  The source code and a DOS Windows 3.1
        executable for the Artificial Ant problem is included.
        Documentation on the base class structures is provided in .txt
        (no pix) and .ps files. Submitted by Tom Poliquin
        <poliquin@netcom.com>

NOTE:
  You should also be aware that most contributions of the Genetic Program-
  ming community are archived by Jim McCoy <mccoy@ccwf.cc.utexas.edu>.
  FTP to ftp.cc.utexas.edu in the "/pub/genetic-programming/code" directory
  there is more *software* related to GP. (cf FAQ A.20)

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/GP/docs/$Id: README,v 1.9 1994/11/27 17:55:08 joke Rel $

**************
***  1994  ***
**************
  *  GPEISTDoc.ps.gz
        Documentation of ../src/GPEIST4.tar.gz
```

```
        Submitted by Tony White &lt;arpw@bnr.ca&gt;

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/GP/papers/$Id: README,v 1.9 1994/11/27 17:55:09 joke Rel $

**************
***  1993  ***
**************
  *  pedes93.ps.gz
        Wolfgang Banzhaf, "Genetic Programming for Pedestrians"
        This paper is an edited version of Technical Report No. 93-03
        (Mitsubishi Electric Research Laboratories, Cambridge, MA). The
        same copyright restrictions apply. A summary of this report is
        published in Proc. of the Int. Conf. on Genetic Algorithms (ICGA),
        Urbana, 1993.

NOTE:
  You should also be aware that most contributions of the Genetic Program-
  ming community are archived by Jim McCoy &lt;mccoy@ccwf.cc.utexas.edu&gt;.
  FTP to ftp.cc.utexas.edu in the "/pub/genetic-programming/papers" directory
  there are more *papers* related to GP. (cf FAQ A.20)

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/EP/$Id: README,v 1.9 1994/11/27 17:55:11 joke Rel $

    This directory contains the Evolutionary Programming section of ENCORE;
it's currently under construction.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/EP/papers/$Id: README,v 1.9 1994/11/27 17:55:12 joke Rel $

**************
***  1993  ***
**************
  *  ep93.ps.gz         (see ../EC/ES/papers)
        Thomas B\"ack, G\"unter Rudolph, and Hans-Paul Schwefel. Evolutionary
        Programming and Evolution Strategies: Similarities and Differences.
        In Fogel and Atmar [FA93].

        [FA93] David B. Fogel and Wirt Atmar, editors. Proceedings of the 2nd
        Annual Conference on Evolutionary Programming, San Diego, CA,
        February 25-26, 1993. Evolutionary Programming Society.

**************
***  1994  ***
**************
  *  fogel94.txt
        A list of publications by David B. Fogel. Reprints of these will be
        made available to "anyone who would want them."

  *  cmplx94.ps.gz
        Charlie H. Clelland and Douglas A. Newlands. PFSA Modelling of
        Sequences by Evolutionary Programming. Presented at Complex '94:
        2nd Australian Conf on Complex Systems, 26-28 Sept '94.
```

```
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/eclairs/$Id: README,v 1.9 1994/11/27 17:55:14 joke Rel $

    This directory contains the banner ".message" of all currently available
EClairs of ENCORE.

  *  dortmund: the mother-of-all-encore sites; not really a mirror,
     but the starting point

  *  santafe: the default EClair, mirrors should be pointed to here

  *  hongkong: the 1st mirror, maintained by Angus Siu

  *  warwick: the 2nd mirror, maintained by Martyn Amos

  *  caltech: the 3rd mirror, maintained by Titus C. Brown

  *  wayne: the 4th mirror, maintained by Chan Jin Chung

  *  capetown: the 5th mirror, maintained by Russell Vincent

  *  eunet: the European default EClair at EUnet Deutschland GmbH

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/jobs/$Id: README,v 1.9 1994/11/27 17:55:15 joke Rel $

    This directory contains jobs announcements, research fellowships, and
other career-oriented stuff.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/cfp/$Id: README,v 1.9 1994/11/27 17:55:15 joke Rel $

    This directory contains "Call For Papers" to conferences, workshops, etc.
related to Evolutionary Computation. Including some other flyers.

  *  ai-genealogy.prj.gz
        The AI GENEALOGY project: Building an AI family tree. Questionnaire by
        Rick Belew. Please, folks, contribute to this endeavour. Thanks!

  *  ep95-award.info.gz
        EP95 best student paper award ($500).

  *  es94.book.gz
        Ingo Rechernberg's "Evolutions Strategie '94" announcement.

**************
***  1995  ***
**************
  *  eama95.cfp.gz
        Workshop "Evolutionary Algorithms in Management Applications"
        University of Goettingen, Germany, 23. Feb. 1995

  *  sac95.cfp.gz
        10th ANNUAL ACM SYMPOSIUM ON APPLIED COMPUTING (SAC '95)
        February 26-28, 1995, Opryland Hotel, Nashville, Tennessee.
        AT THE BEGINNING OF 1995 ACM COMPUTING WEEK! ++Genetic Algorithms
```

and Optimization Track++

* ep95.cfp.gz
  The fourth annual conference on evolutionary programming,
  March 1-4, 1995, Sheraton Harbor Island Hotel, San Diego, CA, USA.

* aisb95.cfp.gz
  Society for the Study of Artificial Intelligence and Simulation of
  Behaviour (SSAISB), University of Sheffield, Sheffield, England
  April 3 -- 4, 1995.

* ecml95.cfp.gz
  ECML-95, 8th EUROPEAN CONFERENCE ON MACHINE LEARNING
  25--27 April 1995, Heraklion, Crete, Greece.

* flairs95.cfp.gz
  FLAIRS-95 International Workshop on Intelligent Adaptive Systems
  (IAS-95), April 26, 1995, Melbourne Beach, Florida

* cifer95.cfp.gz
  THE IEEE/IAFE CONFERENCE ON COMPUTATIONAL INTELLIGENCE FOR FINANCIAL
  ENGINEERING; IEEE/IAFE CIFEr, New York City, April 9-11, 1995

* cad95.cfp.gz
  "Computer Aided Design - 1995" International Conference and
  School (CAD-95) Yalta City (The Commonwealth of Independent States
  - CIS) on May 4-13, 1995.

* informatica95.cfp.gz
  This is a Call For Papers for a special journal issue of INFORMATICA
  on the topic: MIND <> COMPUTER [i.e. Mind NOT EQUAL Computer]
  Papers in 5 hard copies should be received by May 15, 1995.

* inbs95.cfp.gz
  First International IEEE Symposium on INTELLIGENCE in NEURAL AND
  BIOLOGICAL SYSTEMS. May 29-31, 1995, Washington DC Area, USA.
  (Hyatt Hotel, Dulles Airport, VA)

* ecal95.cfp.gz
  The 3rd European Conference on Artificial Life.
  Granada, Spain, 4-6 June, 1995. URL: http://kal-el.ugr.es

* gwics95.cfp.gz
  THE INTERNATIONAL SOCIETY FOR COMPUTERS AND THEIR APPLICATIONS
  THE FOURTH GOLDEN WEST INTERNATIONAL CONFERENCE ON INTELLIGENT SYSTEMS
  Mon. - Wed., June 12, 13, and 14, 1995, San Francisco.

* model95.cfp.gz
  TENTH INTERNATIONAL CONFERENCE ON MATHEMATICAL AND COMPUTER MODELLING
  AND SCIENTIFIC COMPUTING, 5-8 July 1995. Boston Marriott Hotel Copley
  Place, Boston Massachusetts, U.S.A

* ispe95.cfp.gz
  International Conference on INTELLIGENT SYSTEMS IN PROCESS ENGINEERING
  (ISPE'95), Snowmass Village, Colorado, USA. July 9-14, 1995.

* ml95.cfp.gz
  Twelfth International Conference on Machine Learning, Tahoe City,
  California, July 9-12, 1995

* icga95.cfp.gz
  ICGA-95, The Sixth International Conference on Genetic Algorithms
  15-20 July, 1995. University of Pittsburgh, Pittsburgh, Pennsylvania

* aieng95.cfp.gz
  Tenth International Conference AIENG 95--Applications of Artificial
  Intelligence in Engineering, 4-6 July 1995, Udine, Italy

```
  *  ijcai95.cfp.gz
        IJCAI-95, Palais de Congres, Montreal, August 20-25, 1995.

        The biennial IJCAI conferences are the major forums for the
        international scientific exchange and presentation of AI research.
        The Conference Technical Program will include workshops, tutorials,
        panels and invited talks, as  well as tracks for paper and videotape
        presentations.

  *  ida95.cfp.gz
        International Symposium on Intelligent Data Analysis (IDA-95)
        Baden-Baden, Germany. 17th-19th August 1995

  *  cell95.cfp.gz
       INTERNATIONAL WORKSHOP ON INFORMATION PROCESSING IN CELLS AND TISSUES
       Liverpool 6th - 8th September 1995

  *  galesia95.cfp.gz
        First IEE/IEEE International Conference on Genetic ALgorithms in
        Engineering Systems: Innovations and Applications (GALESIA)
        12-14 September 1995; The University of Sheffield, Sheffield, UK

  *  petro95.cfp.gz
        AI Petro, The International Conference on Artificial Intelligence in
        the Petroleum Industry; Incorporating CAIPEP and EUROCAIPEP
        13-15 September 1995; Lillehammer Hotel, Lillehammer, Norway.

  *  soco95.cfp.gz
        SOCO'95 - Soft Computing: fuzzy logic, artificial neural networks
        and genetic algorithms, RIT (Rochester Institute of Technology)
        24-27 ottobre 95; Organizzazione: ICSC (International Computer Science
        Concentions)

  *  aaai95.cfp.gz
        GENETIC PROGRAMMING, 1995 AAAI Fall Symposium Series, Cambridge,
        Massachusettes, November 10 - 12, 1995 (Friday-Sunday)

  *  icec95.cfp.gz
        1995 IEEE INTERNATIONAL CONFERENCE ON EVOLUTIONARY COMPUTING (ICEC '95)
        29 November - 1 December 1995, Perth, Australia.

  *  icsc95.cfp.gz
        ICSC '95 - Third International Computer Science Conference:
        Image Analysis Applications and Computer Graphics
        Hong Kong, December 11-13, 1995

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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---  ../EC/thesis/$Id: README,v 1.9 1994/11/27 17:55:16 joke Rel $

    This directory contains two folders containing Master's thesis, Dimplom-
arbeiten, and PhD dissertations sorted alphabetically by author's name:

  * ../EC/thesis/masters

  * ../EC/thesis/phd

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  Please refer to the toplevel README file ../EC/README for further
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-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

---  ../EC/thesis/masters/$Id: README,v 1.9 1994/11/27 17:55:17 joke Rel $
```

```
    This directory contains Master's thesis, Diplomarbeiten, etc. sorted
alphabetically by author's name:

ENGLISH
  *  fang-msc.ps.gz
        Hsiao Lang Fang. Master's Thesis, "Investigating Genetic Algortihms
        for Scheduling", The University of Edinburgh, Department of Artificial
        Intelligence, 1992.

GERMAN
  *  ruhland-dipl.info.gz
        Jochen Ruhland, Diplomarbeit, "Topologieveraenderndes Lernen in
        Neuronalen Netzwerken mittels Genetischer Algorithmen", Universit"at
        Kassel, FG Neuronale Netzwerke, 1994.

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

---  ../EC/thesis/phd/$Id: README,v 1.9 1994/11/27 17:55:17 joke Rel $

    This directory contains PhD dissertations sorted alphabetically by
author's name:

  * angeline-phd.info.gz

  * kalyanmoy-phd.info.gz

  * levine-phd.info.gz

  * palmer-phd.info.gz

  * tackett-phd.info.gz

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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---  ../EC/etc/$Id: README,v 1.9 1994/11/27 17:55:18 joke Rel $

    This directory contains miscellaneous stuff, e.g. test data suites in the
../EC/etc/data folder:

  *  ../EC/etc/TSP
        TSP (Travelling Salesman Problem) data, aka "TSP-lib".

  *  ../EC/etc/zero-one
        Multiple 0/1 Knapsack problem instances.

    Test problems ../EC/etc/problems folder:

  *  ../EC/etc/problems/multi.tst contributed by Andy Keane

    PostScript figures related to ENCORE in the ../EC/etc/ps folder:

  *  ../EC/etc/ps/overview.ps
        EPS figure of the whole contents.

  *  ../EC/etc/ps/sections.ps
        EPS figure of the whole directory structure.

  *  ../EC/etc/ps/logo.ps
        Color EPS figure of the ENCORE logo.
```

```
    HTML texts related to ECNORE in the ../EC/etc/html folder:

  *  ../EC/etc/html/gautlet*.html
        A collection of the ENCORE aerosmiths.

    GIF pictures related to ENCORE in the ../EC/etc/gif folder:

  *  ../EC/etc/ps/encore.gif
        The network's EClairs at a glance.

    Funny/recreational stuff "from The Net"

  *  ../EC/etc/fun/genome.c
        Translation of human genome to C (fragment only).

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  Please refer to the toplevel README file ../EC/README for further
  explanations. A handbook to this service is in ../EC/handbook.
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--- ../EC/etc/data/TSP/$Id: README,v 1.9 1994/11/27 17:55:19 joke Rel $

**************
***  1991  ***
**************
  *  tsplib-1.2.tar.gz
        TSPLIB can be freely distributed for research purposes.

        Gerhard Reinelt
        Institut fuer Mathematik
        Universitaet Augsburg
        Universitaetsstrasse 8
        D-8900 Augsburg, Germany

        Tel.   (821) 598 2212
        Fax    (821) 598 2200

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  Please refer to the toplevel README file ../EC/README for further
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-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-

-- ../EC/etc/data/orlib/$Id: README,v 1.9 1994/11/27 17:55:19 joke Rel $

Instructions on how to use OR-Library can be found in the file paper
or in the article J.E.Beasley, "OR-Library: distributing test
problems by electronic mail", Journal of the Operational
Research Society 41(11) (1990) pp1069-1072.

J.E.Beasley, June 1990.
             Revised June 1992, April 1993, March 1994, October 1994.

All the files in OR-Library are available via anonymous ftp to
      mscmga.ms.ic.ac.uk
The numeric equivalent of this ftp address is 155.198.66.4

This will send you the info page I emailed earlier and also add your
email to a list so that you will automatically informed of updates
as they occur (one or twice a year)

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--- ../EC/etc/data/zero-one/$Id: README,v 1.9 1994/11/27 17:55:20 joke Rel $
```

```
**************
***  1993  ***
**************
  *  sac94-suite.tar.gz

This directory contains a collection of 0/1 Multiple Knapsack Problems,
that are well known from LITERATURE, and heuristically solved in the
following publications:

Tabu Search:
  F. Dammeyer and S. Voss (1991) "Dynamic tabu list management using
    the reverse elimination method."
    Annals of Operations Research.

Simulated Annealing:
  A. Drexel (1988) "A Simulated Annealing Approach to the Multiconstraint
    Zero-One Knapsack Problem."
    Computing, 40:1-8.

Genetic Algorithms:
  S. Khuri, T. Baeck, J. Heitkoetter, (1994) "The Zero/One Multiple
    Knapsack Problem and Genetic Algorithms", 188-193, in the 1994
    ACM Symposium on Applied Computing, SAC'94, Phoenix, Arizona.
    See also: ../EC/GA/papers/sac94.ps.gz

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LITERATURE
  C.C. Petersen (1967) "Computational experience with variants of the
    balas algorithm applied to the selection of R&D projects."
    Management Science, 13:736-750. [PET*.DAT]

  S. Senyu and Y. Toyada (1967) "An apparoach to linear programming
    with 0-1 variables."
    Management Science, 15:B196-B207. [SENTO*.DAT]

  H.M. Weingartner and D.N. Ness (1967) "Methods for the solution of
    the multi-dimensional 0/1 knapsack problem."
    Operations Research, 15:83-103. [WEING*.DAT]

  W. Shi (1979) "A branch and bound method for the multiconstraint
    zero one knapsack problem."
    J. Opl. Res. Soc., 30:369-378. [WEISH*.DAT]

  A. Freville and G. Plateau (1990) "Hard 0-1 multiknapsack testproblems
    for size reduction methods."
    Investigation Operativa, 1:251-270. [PB*.DAT, HP*.DAT]

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FILE FORMAT
  The test data's file format, using 10 columns, whenever possible, is
  as follows:

  <n := #knapsacks> <m := #objects>
  <m weights of objects>
  <n knapsack capacities>
  <A := mxn mmatrice of constraints>

  <known optimum>

  <name>

  [ok]

-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
```

```
EXAMPLE
  This is the WEING1.DAT data file plus some comments, that are NOT
  part of the problem instance!

  2  28  // 2 knapsacks, 28 objects
   1898    440  22507     270  14148   3100   4650  30800    615   4975
   1160   4225    510   11880    479    440    490    330    110    560
  24355   2885  11748    4550    750   3720   1950  10500  // 28 weigts
    600    600  // 2 knapsack capacities
     45      0     85     150     65     95     30      0    170      0
     40     25     20       0      0     25      0      0     25      0
    165      0     85       0      0      0      0    100  // #1 constr.
     30     20    125       5     80     25     35     73     12     15
     15     40      5      10     10     12     10      9      0     20
     60     40     50      36     49     40     19    150  // #2 constr.

  141278  // optimum value

  WEINGARTNER 1  // name of the game

  // sometimes an "ok" happens to be here, just ignore it...

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--- ../EC/refs/$Id: README,v 1.9 1994/11/27 17:55:21 joke Rel $

    This folder contains a collection of other bibliography collections.

**************
***  1993  ***
**************
  *  ea-app.ps.gz
        A quarterly updated list of references sorted by
        application domain wrt EC paradigms, from SyS at UniDO.

  *  ec-ref.bib.gz, ec-ref.ps.gz
        A bibliography of over 500 entries in the area of
        EC (GA/ES/EP/GP) in BibTeX and PostScript formats (Version 1.3).
        From:
                magenta.me.fau.edu:/pub/ep-list/bib/EC-ref.bib.Z
                magenta.me.fau.edu:/pub/ep-list/bib/EC-ref.ps.Z

        Maintained by N. Saravanan. Please send any additions
        and corrections to <saravan@amber.me.fau.edu> or
        <EP-List@magenta.me.fau.edu>.

  * gp-ref.gz
        An annotated bibliography on genetic programming
        as posted to GA Digest. Plain text format.
        From: John Koza <koza@CS.Stanford.EDU>

**************
***  1994  ***
**************
  *  2500GArefs.ps.gz (garbo.uwasa.fi:/pc/research)
        A bibliography of over 2500 entries in the area of
        EC (GA/ES/EP/GP) in PostScript format.

        Maintained by Jarmo Alander. Please send any additions
        and corrections to <ja@cs.hut.fi>

  *  cogann.bib.gz
        Dave Schaffer's COGANN "COmbinations of Genetic Algorithms and
        Neural Networks" bibliography collection in refer(1) format.
```

```
        BibTeX users should note that conversion tools exist "on the Net"
        e.g., refertobib(1)

  *  fuzzy.bib.gz
        Antony Satyadas <antony@cs.ua.edu>
        Bibliography for Evolutionary Fuzzy Modeling

  *  fracimg-ref.gz
        References concerning Fractal Image Compression using EAs.
        From: D J Nettleton <D.J.Nettleton@durham.ac.uk> (comp.ai.genetic)

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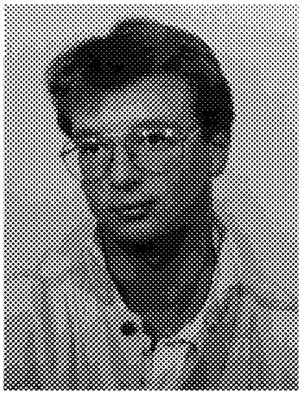
-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-==-
```



Bibliography

'Tuschetränen.' unpublished, 1986.

'Epitaph to a Broken Dream.' unpublished, 1989, 1990.

'...with the Eyes of a Child.' unpublished, 1991.

'Telltale Songs from a Rumblefish.' Usenet: rec.arts.poetry, 1993.

'The Last Bohemian's Rhapsody...' unpublished, 1993, 1994.

'Script from a Jester's Travels...' unpublished, 1994.

'A Pocketful of Eloquence.' unpublished, 1995.

The Story so far

Jörg Heitkötter, was born in Recklinghausen, Germany in 1965. He was educated at Hittorf-Gymnasium, Recklinghausen, Ruhruniversität Bochum (RUB) and Universität Dortmund (UNI-DO), where he read *theoretical medicine, biology, philosophy* and (for whatever reason) *computer sciences*.

He volunteered as a RA in the Biomathematics Research Group from 1987 to 1989, at the former "Max-Planck-Institute for Nutrition Physiology," in Dortmund (since March 1, 1993 renamed to "MPI for Molecular Physiology"), and spent 3 years at the "Systems Analysis Research Group," at the Department of Computer Science of the University of Dortmund, where he wrote a particularly unsuccesful thesis on "Learning Classifier Systems." He's still trying to break Chris Langton's semester record.

Moreover he volunteered as an editor of the FAQ in Usenet's **comp.ai.genetic** newsgroup, entitled *The Hitch-Hiker's Guide to Evolutionary Computation.* He also helped to bootstrap several other FAQ projects, among them, Howard Gutowitz' FAQ on Cellular Automata, available on Usenet via **comp.theory.cell-automata**, and created ENCORE, the Evolutionary Computation Repository Network that is accessible via **alife.santafe.edu /pub/USER-AREA/EC** (Santa Fe, NM, USA), **ftp.krl.caltech.edu /pub /EC** (Pasadena, CA, USA), **ftp.cs.cuhk.hk /pub/EC** (Hong

Kong), **ftp.dcs.warwick.ac. uk /pub/mirrors/EC** (Warwick, UK). **ftp.cs.wayne.edu /pub/EC** (Detroit, MI, USA), **ftp.uct.ac.za /pub/mirrors/EC** (Capetown, ZA). An experimental service is based at **ftp.germany. eu.net /pub/research/softcomp/EC** (Dortmund).

With Adam Gaffin, a former senior newspaper reporter from Middlesex News, Boston, MA, who is now with *Networks World*, he edits the most read book on Internet, that was launched by a joined venture of the Electronic Frontier Foundation (EFF) and the Apple Computer Library, called the *EFF's (Extended) Guide to the Internet: A round trip through Global Networks, Life in Cyberspace, and Everything...* Parts of this, currently only electronically available some 300 pages book, will find their way into a German issue, that is planned for the first quarter of 1995, and will be published by Addison-Wesley, Germany. The working title is *Das Restaurant am Ende des Internet*, i.e., *The Restaurant at the End of the Internet*.

Two more books are forthcoming: with Marvin Minsky, he works on an electronic version of a new edition of *Finite and Infinite Machines*, and with various Hackers around the globe he puts together something called *The Internet Hacker's Filofax*.

Since a very special event, he has severe problems to take life seriously, and consequently started signing everything with "-joke." He continues to work on a "diary-like lyrics collection" of questionable content, entitled *A Pocketful of Eloquence*, with the parts *Tears of Ink* (1986), *Epitaph to a Broken Dream* (1989, 1990). *...with the Eyes of a Child* (1991), *Telltale Songs from a Rumblefish* (1993), *The Last Bohemian's Rhapsody...* (1993, 1994) already finished and the current *Script from a Jester's Travels...* in its final stage for publication by the end of 1994.

He likes *Mickey Rourke*'s movies (especially "Rumblefish"), English poetry of medieval times (especially *Edmund Spenser*), *McDonalds* Hamburgers, diving into the analysis of complex systems of any kind (but prefers the long-legged ones), and the books by *Erasmus of Rotterdam, Robert Sheckley, Alexei Panshin*, and, you name it, *Douglas Adams*.

He has no time to get married, has no children (he'd know of), and still doesn't live in Surrey.