

EXERCISES IN FORECASTING I

Copying Data to the G Disc

The data series which you will be analysing with *MESOSAUR* should be copied into a directory on the virtual disc to which the QMW network gives you access. This is G disc. You can structure your own data directories in any way which pleases you. If you were to establish a directory on the G disc called simply DATA, then this would correspond to the name which *MESOSAUR* applies to its import-export directory via the default setting which results from your typing a <Return> in response to one of the queries during the process of configuration:

Default data directory [G:\DATA]:

You might prefer to use a more elaborate structure of directories of the form

$$G:\backslash\text{MESDATA} \left\{ \begin{array}{l} \backslash\text{DATDATA} \\ \backslash\text{TXTDATA} \\ \backslash\text{MYDATA} \end{array} \right.$$

To show how to create this structure, let us imagine that you have succeeded in logging onto the network and the you have found your way onto the C disc. (The 486 machines have a RAM disc which is the designated the C disc which does not seem to have any particular use) The following sequence of commands will serve bring you back to the G disc and to create the above system of directories. The final command will place you inside the TXTDATA sub-directory:

| | |
|-------------------------|---|
| C:\>G: | <i>Move to the G disc</i> |
| G:\>md MESDATA | <i>Create the MESDATA directory</i> |
| G:\>cd MESDATA | <i>Move into the MESDATA directory</i> |
| G:\MESDATA>md TXTDATA | <i>Create the TXTDATA sub-directory</i> |
| G:\MESDATA>md DATDATA | <i>Create the DATDATA sub-directory</i> |
| G:\MESDATA>md MYDATA | <i>Create the MYDATA sub-directory</i> |
| G:\MESDATA>cd DATDATA | <i>Move into the DATDATA sub-directory</i> |
| G:\MESDATA\DATDATA>cd.. | <i>Move back from the DATDATA sub-directory</i> |
| G:\MESDATA>cd TXTDATA | <i>Move into the TXTDATA sub-directory</i> |

In this example, we have used the command `md NAME` to make a directory and `cd NAME` to change the current directory, i.e. to move into the named directory. The name of the relevant directory must be specified except in the

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case of the command `cd..` which enables you to step back into the parent directory (which contains the current directory). In the foregoing example, we have stepped back from the directory `DATDATA` which we entered by mistake, and we have proceeded to enter `TXTDATA` instead. Had we created a directory with an inappropriate name, this could have been removed with the command `rd NAME`. The purpose of entering the `TXTDATA` directory via the final command is to be well-placed for copying a file into that directory:

```
G:\MESDATA\TXTDATA>copy F:\MOREDATA\TXTDATA\CATALOG
```

The file in question is `CATALOG` which is to be found in the `TXTDATA` directory which is nested within the `MOREDATA` directory which is to be found on the `F` drive. The `CATALOG` file contains a list of the contents of the files in the `TXTDATA` directory which resides on the `F` disc. By typing `edit CATALOG`, you will invoke the `DOS` editor at the same time as opening the file which has been copied. You should see the following display:

`VOSTOCK`

Mean CO2 concentrations in Vostok ice core. Best estimates
and corresponding uncertainties, against age and depth
SOURCE: Barnola et al. (1987), Nature vol. 329, 408--413

`ACENTURI`

The magnitude (i.e. a measure of the brightness) of a
variable star at midnight on 600 successive days
SOURCE: Whittaker and Robinson,
The Calculus of Observations, Fourth Edition (1944)
pps. 349--352

`AIDS`

Global Estimates of Cumulative HIV/AIDS Cases 1980-93
SOURCE: Vital Signs, WorldWatch Institute

Numerous items follow these ones.

It might be worthwhile to copy some data into the `DATDATA` directory on the `G` disc from the directory of the same name on the `F` disc. The following commands will serve the purpose:

```
G:\MESDATA\TXTDATA>cd..
```

```
G:\MESDATA>cd DATDATA
```

```
G:\DATDATA\TXTDATA>copy F:\MOREDATA\DATDATA\*.DAT
```

The entire contents of the `DATDATA` directory on the `F` disc will be copied. The final string to be typed is `*.DAT`. Its effect is to cause all files within the directory whose names bear the suffix `DAT` to be copied.

Fitting Exponential and Logistic Functions

The contents of the directory TXTDATA on the F disc can be revealed by entering the directory and typing the command `dir/w`. The modifier `/w` causes the contents to be printed wide, ie. across the screen. The alternative modifier `/p` enables a vertically-arrayed list to be displayed one page or screenful at a time. Pressing <Return> displays the next screenful if the bottom of the list has not yet been reached.

```
F:\MOREDATA\TXTDATA>dir/w
```

```
Volume in drive F is DOS5
Volume Serial Number is 1E2D-BD05
Directory of F:\MOREDATA\TXTDATA
```

```
[.]          [...]      VOSTOK.TXT   ACENTURI.TXT AIRLINE
AIRLINE.TXT  APPAREL.TXT  B&JSALES.TXT BELGOPOP.TXT BEVERIDG.TXT
CABLE.TXT    CARPROD.TXT  CARSALES.TXT CETAVE.TXT  CHEMCONC.TXT
CLOCK.TXT    COMMIND.TXT DAILYCO2.TXT DAYLENGT.TXT DEATHS.TXT
DISCHARG.TXT ELECTRIC.TXT ENERGY.TXT  FIXINV.TXT  GBCARREG.TXT
GILTS.TXT    HOMEFED.TXT HOUSTART.TXT IBMSTOCK.TXT ICISTOCK.TXT
INC&CON.TXT  LYNX.TXT     MALVOL.TXT   MEATCON.TXT  METS.TXT
MONTHCO2.TXT NITRATE.TXT  NUCLEAR.TXT  PLANT.TXT    PROFIT.TXT
RAILFARE.TXT RAILPASS.TXT RETAIL.TXT   RIVERMUD.TXT RTFLOW.TXT
SALES.TXT    SCOTPOP.TXT  WORLD OIL.TXT WKINVEST.TXT WINTEM.TXT
VARSTAR.TXT  USBOND.TXT   CATALOG      AIDS.TXT     GLOBEPOP.TXT
JABS.TXT
56 file(s) 95189 bytes
19947520 bytes free
```

Various files should be copied from the directory above into the TXTDATA directory on your G disc. They are

```
AIDS.TXT  GLOBEPOP.TXT  WORLD OIL.TXT  JABS.TXT  NUCLEAR.TXT
```

These files need some processing before they can read by *MESOSAUR*. Use the DOS editor to open GLOBEPOP.TXT:

```
World Population 1950-93
SOURCE: US Bureau of Census
```

```
YEAR BILLIONS
```

```
1950      2.555
1955      2.779
1960      3.038
```

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| | |
|------|-------|
| 1961 | 3.079 |
| 1962 | 3.135 |
| 1963 | 3.204 |
| 1964 | 3.276 |
| 1965 | 3.345 |

All that is required in order to make the file readable is to remove the text at the top. It is also advisable to remove the first two observations so that the remaining observations are at yearly intervals. When this has been done, you may store the file in the `DATDATA` directory on your `G` disc under the name `GLOBEPOP.DAT`. The file can now be read by *MESOSAUR* provided that the program is informed that `DATDATA` is its import–export directory. *MESOSAUR* can be given this information in the initial process of configuring the program. Thus, when you are confronted by the prompt

Default import directory [G:\IMPEX]:

your might respond by typing

G:\MESDATA\DATDATA

followed by `<Return>`. Alternatively, you can reconfigure *MESOSAUR* via the **System** menu while the program is running.

Amongst the above-mentioned files, `AIDS.TXT` and `GLOBEPOP.TXT` contain series which appear to be following exponential growth paths. Eventually the growth will be brought to a halt; and it is interesting to investigate whether there are any signs of a diminution in the rates of growth. You should fit an exponential model to each series. Then you might take the logarithms of the series and proceed to fit linear time trends. If a series is following an exponential path, then the logarithmic series should follow a straight line.

The remaining files `WORLD OIL.TXT`, `JABS.TXT` and `NUCLEAR.TXT` contain series to which logistic models may be fitted. You should form an opinion, in each case, about the appropriateness of the logistic model.

The exponential and the logistic models are fitted by invoking the relevant options under the **Models** menu. You should have no difficulty in finding the **Univariate Models** submenu. Select the **Trends** option. Then select the series to be analysed from the list at the left. Press the space bar until the trend which you wish to fit is displayed. You have the following choices:

linear $y(t) = At + C$

exponential $y(t) = \exp(At + B) + err$

parabolic $y(t) = At^2 + Bt + C$

logarithmic $y(t) = A \ln(t + B) + C$

logistic $y(t) = A/(1 + \exp(B - Ct))$

power $y(t) = A(t + B)^c$