Has the mainframe become obsolete?

Cristofani Renza *, Bracci Edoardo**, Cresci Guglielmo**, Vigotti Maria Angela*.

* Department of Public Health and Biostatistics: University of Pisa and CNR: Institute of Clinical Physiology
** CNUCE Institute of CNR, Pisa, Italy.

ABSTRACT

An epidemiological application, born on mainframe platforms, evaluates mortality rates of tumors certified in Italy in the period 1981-84 and it relates them to the migratory phenomena hold in the country from the fifties to the seventies.

The application uses a data set with about 500,000 observations and 10 variables per record.

Results, obtained using the SAS software, consist of graphic presentation of standardised mortality ratios for many combinations of geographic (birth and last residence places) and thematic data (sex, age, tumor mortality causes, etc.).

We evaluated the downsizing of such application to get an user friendly interface with graphic and geographic presentations of results.

Tests on various PC platforms, UNIX workstations and mainframe were executed looking for their computer capacity limits, while working with relatively small data sets (less than 5 megabytes).

A satisfactory solution can be obtained by using the SAS System in a PC environment or in a client-server environment with a powerful server (for exemple a PC Pentium or a workstation UNIX), able to supply the required computing capability.
About 500,000 Italian national mortality certifications of tumours in the period 1981-84 were analyzed by using Standardized Mortality Ratios (SMR) in relation to the migratory phenomena held in the country from the fifties to the seventies.

This illustrative analysis confirms, as reported in previous studies, a decreasing trend for cancer mortality with a decreasing latitude and a protective effect of being born in the southern side of the Country.

The following map shows all cancer SMRs for stable residents.
Data and methods

Mortality data by age, sex, birth place (region and province), last residence place, causes of death and marital status.

Census registrations stratified by the previous variables are used as standard population.

Stable residents are defined as people born and died in the same place (area, region or province).

Migrants are defined as people born and died in different places.

The SMR is an index, adjusted by age, that compares the observed number of deaths to an expected one. The expected number of deaths is based on mortality rates of a standard population. Thus:

\[
\text{SMR} = 1 \text{ means no difference,}
\]
\[
\text{SMR} > 1 \text{ indicates an excess of risk.}
\]

Results: thematic maps

The user can perform several analyses by sex, by birth-place or last residence-place (area, region or province) and by tumor mortality causes.

Three runs, one for each geographic unit (5 big areas, 20 regions, 95 provinces), are described here. The following thematic maps show the SMRs computed on males for all tumor mortality causes.
All cancer SMRs for males born in the south area, by 5 geographic areas of death

This run is composed of about 10 data steps and 10 Proc Means.
All cancer SMRs for males born in Campania, by 20 administrative regions of death

This run is composed of about 40 data steps and 40 Proc Means.
All cancer SMRs for males born in Napoli, by 95 provinces of death

This run is composed of about 190 data steps and 190 Proc Means.
Results: response times (mm:ss)

Computing environments

Runs:

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>5 geographic areas (north-west, north-east, north-central, south-central, south)</td>
</tr>
<tr>
<td>2</td>
<td>20 administrative regions</td>
</tr>
<tr>
<td>3</td>
<td>95 administrative provinces</td>
</tr>
</tbody>
</table>

Computing environments:

<table>
<thead>
<tr>
<th></th>
<th>Hardware</th>
<th>Operating System</th>
<th>SAS version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HP 9000/715 75 MHz</td>
<td>UNIX</td>
<td>6.09</td>
</tr>
<tr>
<td>B</td>
<td>PC Pentium 90MHz 16MB</td>
<td>DOS 6</td>
<td>6.10</td>
</tr>
<tr>
<td>C</td>
<td>PC 486 DX2 66MHz 16MB</td>
<td>DOS 6</td>
<td>6.08</td>
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<td>D</td>
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<td>DOS 6</td>
<td>6.10</td>
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<tr>
<td>E</td>
<td>PC 486 33MHz 16MB</td>
<td>DOS 6</td>
<td>6.08</td>
</tr>
<tr>
<td>F</td>
<td>IBM 9121-440</td>
<td>VM/ESA rel. 1.1</td>
<td>6.08</td>
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