PV-WAVE offers some standard functions suitable for the representation of meteorological fields: contour maps together with color maps (black-and-white and color-filled maps), vector field maps, 16 standard mapping projections plus the ability to accept user-defined projections.

I QUICK FACTS I

An Italian technology company, Finsiel, uses PV-WAVE for modeling weather forecasts. Finsiel has implemented a PV-WAVE graphical user interface for managing the elaborations and the numerical output of a limited-area model (LAM). These LAMs are used to forecast weather conditions in a limited area. PV-WAVE allows for quick and easy analysis of LAM output and the ability to represent this data graphically.

I THE PROBLEM I

Over the years, numerical modeling for weather forecasting has become increasingly advanced, for both global-scale models and limited-area models (LAMs). Global models are used to forecast weather conditions in a hemisphere, whereas, LAMs are used to forecast weather conditions in a limited area, using as the initial and boundary conditions, the output of global models. In particular, LAMs are currently used with a horizontal resolution as fine as 10 km. These models usually have about 30 vertical levels and span areas on a hundred-kilometer scale, each day producing hundreds of megabytes of data.

Notwithstanding the huge amount of data produced, LAM numerical output must be easily and quickly represented graphically in order to give meteorologists the possibility to analyze the data as soon as possible. The standard graphical representations used by meteorologists are contour maps, color maps and cross sections (i.e., representations, with contour lines of vertical “slices” of the atmosphere). The forecasted represented parameters are, typically, precipitation, temperature, pressure, cloudiness, and wind vectors. Finsiel is Italy’s principal information technology company. It has been operating since 1987 in the field of meteorology, paying particular attention to meteorology for agriculture, the environment
and protection against natural disasters. Finsiel operates mainly with national and local public administrations; it created the National Agrometeorological Service for the Italian Ministry of Agriculture, the Agrometeorological Service of the Puglia Region, and with other companies, the Agrometeorological Service of the Sardinia Region. Furthermore, Finsiel worked to create the Hydro-Meteorological Centre of the Liguria Region with the Physics Department at the University of Genoa.

I THE SOLUTION I

For its meteorological applications, Finsiel implemented a graphical user interface, denoted MODELMap, using PV-WAVE for managing the elaborations and the numerical output of a LAM.

Finsiel chose PV-WAVE for this application for several reasons. It guarantees a standard environment, either in UNIX® or Windows® NT, whose applications are easily portable from one platform to another. Furthermore, PV-WAVE offers some standard functions suitable for the representation of meteorological fields: contour maps together with color maps (black-and-white and color-filled maps), vector field maps, 16 standard mapping projections plus the ability to accept user-defined projections. In particular, its “movie” utility is useful for showing the time evolution of the meteorological conditions. PV-WAVE offers a fourth-generation language for creating a graphical user interface as an X-windows application, with icons, buttons, etc.

Finsiel's MODELMap's main functions are:

- Definition of the parameters for the execution of the LAM
- Monitoring of the LAM’s execution, with the visualization of the error log
- Monitoring of the post processing of the LAM’s output in order to obtain an elaboration of the forecasted parameters (i.e., total precipitation over a two-day period rather than over a three-hour period)
- Quick and easy production of graphical output on screen, printer or file, of the forecasted meteorological field
In particular it may produce:

- Contour and filled maps,
- Vector field maps (for wind) and
- Animation of the output

This last function is quite attractive and gives visual proof of the power of PV-WAVE — visualization of the territorial data (orography, land-sea-mask) used by the LAM, memorized in raster format.

| RETURN ON INVESTMENT |

The MODELMap application developed by Finsiel may be adopted by operative meteorological services that run their own LAM or by users who receive through telecommunications, the numerical output of a forecast model run by another service. The application may be used to manage the graphical elaboration of meteorological fields estimated by diagnostic or prognostic models.

| WORLD CLASS PRODUCTS, SERVICES, AND SUPPORT |

For over 30 years, Visual Numerics, with its PV-WAVE and IMSL product families, has provided trusted visualization and numerical analysis tools to thousands of technical professionals in a broad range of industries around the world. Scientists, researchers, educators, engineers, developers, Intranet managers, testers and analysts use Visual Numerics’ development tools to solve problems, identify trends and share results.

The PV-WAVE Family has all of the functionality you need in one tool, including an open software environment allowing for integration with new technologies, and the IMSL Library which delivers over 370 mathematical and statistical routines, creating the most powerful data analysis software available. The IMSL libraries can dramatically accelerate development by reducing programming time by up to 95%.

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