A RESERVOIR OPERATION DSS BASED ON OPTIMIZATION AND NEURO-FUZZY TECHNIQUES

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Successful integrated management of water supply systems requires the effective use of Decision Support Systems (DSS) able to support managers to make key decisions. In water resources, DSS are currently used for reservoir system management by several private and public organizations (Labadie, 1999, Andreu, 1996). Generally DSS's rely on operations research techniques in order to prescribe optimal behavior. This normative approach can be combined with a descriptive approach, including the use of heuristics to account for human judgment and qualitative analysis. In such perspective, fuzzy rule-based systems for inferring operating rules are gaining increasing attention.

In the present paper, an updated version of the DSS RESOPER (REServoir OPERation) is presented (Cancelliere et al., 2003). The objective of RESOPER is to aid decision makers in managing a single reservoir system taking into account water scarcity conditions. RESOPER enables to easily develop and validate reservoir operating rules. After a series of optimal releases is obtained by dynamic programming, such releases are expressed as a function of water volumes stored in the reservoir, unregulated monthly inflows and other variables (monthly releases and demands) by means of multiple regression equations, neural networks or fuzzy rules. In particular, the latter feature has been added in the latest update of the software. The core modules of the DSS RESOPER, shown in Fig.1, include: a GUI managing all user input-output; a computational engine, where all the algorithms are implemented; the file and database modules, which manage hydrological and operational data.

A sample application of the DSS to a Sicilian Case-study is reported in the paper.

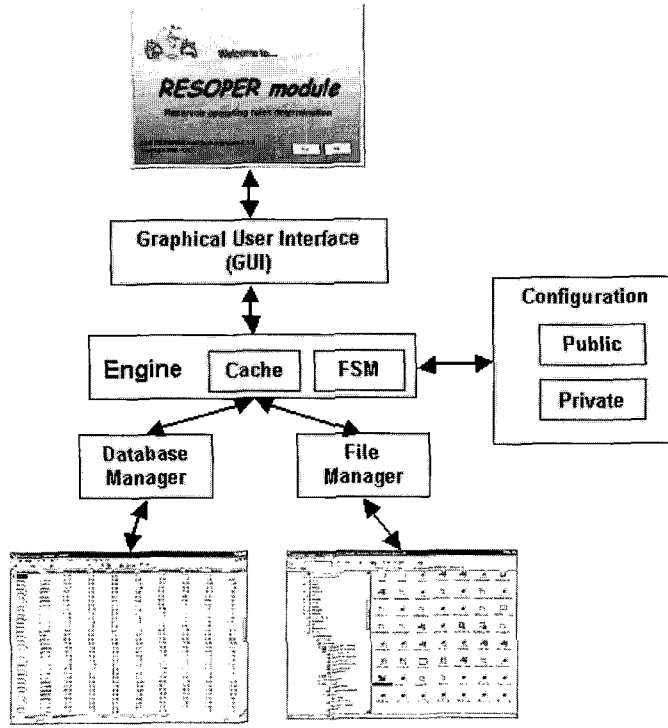

Fig. 1 RESOPER core modules.

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