

Model and Data Driven Multi-Criteria Spatial Decision Support Systems

Human decision-making is in many cases less than optimal and it further degrades with the complexity of the problem and external stress factors. The need to improve the quality of decision-making and reduce the probability of wrong judgements gives rise to intensive research in this area.

Because of the unique spatial capabilities of GIS, research has led to an interest in combining traditional decision support methods with GIS in what is referred to as Multi Criteria Spatial Decision Support Systems (MC-SDSS). Applications keep growing into areas such as environmental, urban planning, natural resource management, transportation, and business analytics.

organizations, there is a need to assist decision makers to focus on the most critical aspects. With the realization that many problems that decision makers face have a spatial component, there has been a rise of the so-called location decision problems, representing a major area in operations research. Currently, research focuses on the improvement of models, the use of intelligent agents, new and more robust visualization systems, and web-based processing all geared to improve the quality of decision making.

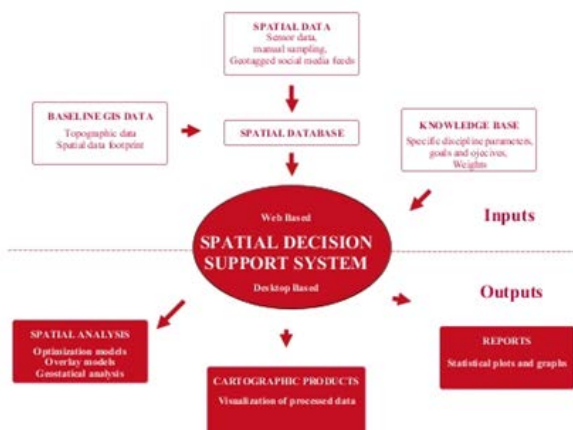


Figure 1. The broader structure of most SDSS.

While MCDA is potent in many facets of decision problem solving, one major shortcoming is that it does not allow the comparing of huge numbers of alternatives needed in some spatial decision problems, such as the multi-site allocation. The probability of choosing a sub-optimal solution in this situation is greatly increased. To solve this problem, the application of optimization techniques, which yield optimal solutions from an infinitely large set of alternatives, becomes very pragmatic. These techniques includes heuristic and mathematical programming approaches in the case of multi objective problems and single objective problems.

With the proliferation of large volumes of data available for management and analysis in

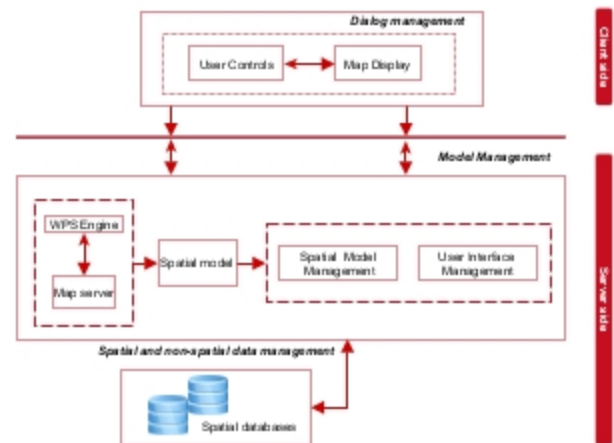


Figure 2. Example of a web based SDSS architecture

Exemplary topics for master thesis:

- For more details about exemplary topics, please refer to the display case of the chair “Methods of Geoinformation Science” at room H5121 (main building of Technische Universität Berlin).

Recommended skills:

- Mathematical modelling, GIS analysis, programming (Python)