**INTELLIGENT DECISION SUPPORT SYSTEMS**

**(Master in Artificial Intelligence, UPC-URV-UB)**

Fall semester, Course 2011/2012

October 13th, 2011

**Practical Work 3 (PW3, Group work) due on: January 18th, 2012**

The objective of this exercise is a research work, including some practical software development or data analysis, about several features of Intelligent Decision Support Systems.

There will be 4 different practical works. One work for each group.

**PW3.1 - Analysis of the state of the art in Intelligent Decision Support Systems**

The objective of this exercise is to make an analysis of the field of Intelligent Decision Support Systems (IDSS). This analysis will be done through an accurate data analysis of a sample of the output data coming from a review of 22 research papers (i.e, the results of PW2) published in quality international journals indexed in the Science Citation Index (SCI) related to the Intelligent Decision Support Systems / Decision Support Systems field.

The data coming from these papers gives a representative initial insight of the field of Intelligent Decision Support Systems (IDSS). This data will be coded in a matrix of 22 rows, one per paper. Each column of the matrix will be an outstanding feature characterising the IDSS which is described in the journal article. These features are selected by the teachers. The matrix will be in an EXCEL file in the “Racó de la FIB”.

Every student in the course will provide input for 2 papers, in two rows of the data matrix. Students assigned to this practical work must merge the inputs of the remaining colleagues into a single data matrix and analyse the resulting matrix. The scheme of hte analysis will be discussed with Pr. Karina Gibert. The work will be developed in R by writing scripts suitable to be run in the future with other samples of papers, provided the structure of the data matrix keeps constant. The analysis must summarise the knowledge and valuable information discovered in the data. These results will help to characterise the state of the art in IDSS.

Students must deliver a ZIP file named as “PW31-IDSS-1112-FirstName-LastName of all authors”, **through the “Racó de la FIB”,** containing the following information:

1. One file containing the final report with the analysis
2. The scripts in R to run the corresponding graphics or statistical calculations in the proper order.

**PW3.2 - Research and implementation of a hierarchical indexation scheme for a Case-Based Reasoning tool within an Intelligent Decision Support System tool (GESCONDA)**

GESCONDA contains a module for case based reasoning. Currently, the cases library is a flat data matrix with a case per row. As long as the library grows, searches becomes less efficients with this structure.

The main goal of this work is to implement and develop de necessary code to introduce the possibility to index the cases and reorganize the cases lybrary according to this hierarchy.

Specifications of the classes and methods to be implemented and inserted in the application will be provided. In Annex I an introduction to case based reasoning as well as to indexing methods is provided.

Interface design to interact with the system is crucial for the work.

The system must provide the user the possibility to define the attributes to be used for indexing and their depth in the hierarchy. Also, connection with feature weighting module must provide automatic criteria for the hierarchy.

The process to growth the case library with new experiences must be implemented.

Also, the process to retrieve relevant cases for a question-case must be implemented.

All this functionalities must use the methods already implemented in GESCONDA whenever possible.

Be sure to agree classes design and conceptual model with the teachers before implementation, as well as design of screens for the interface.

Bea Sevilla will assist in technical details related with GESCONDA [bea.sevilla@gmail.com](mailto:bea.sevilla@gmail.com)

Include Dr. Sànchez-Marrè and Dr. Karina Gibert in the mailing

Students must deliver a ZIP file named as “PW33-IDSS-1112-FirstName-LastName of all authors”, **through the “Racó de la FIB”**, containing the following information:

1. Java Code of the implemented classes
2. New version of GESCONDA including the improvement. Bea will assist in the integration. Font codes, Eclipse project and final user distribution (executable jar file)
3. Document describing the classes implemented and how have been integrated into the global tool
4. Document with results of tests showing the searches improved. One of the tests must be done with a case library of data mining methods, provided by the teachers. Indexation must replicate the taxonomy of data mining methods presented in the course.
5. New version of user manual

**PW3.3 – Improving a recommender system for selecting the best data mining methods within an Intelligent Decision Support System tool (GESCONDA)**

GESCONDA has a module for recommending the most appropriate data mining technique for a new data matrix to be analyzed.

Currently, the recommender is implemented in a previous version partially running. An Eclipse project will be delivered with a short document explaining the classes as a reference.

The recommender combines a knowledge-based part with a case-based part. The knowledge base uses the conceptual map of data mining methods presented in the course.

It is important to redesign the classes structure in such a way that this conceptual map can change over time without requiring new programming.

Also the interface to introduce cases into the case library must be implemented.

Connection with the case based reasoning module must be solved

Please meet dr. Karina Gibert to agree with her the structure required for that, and the algorithms to be implemented

Students must deliver a ZIP file named as “PW32-IDSS-1112-FirstName-LastName of all authors”, **through the “Racó de la FIB”**, containing the following information:

1. Java Code of the implemented classes
2. New version of GESCONDA including the improvement. Bea will assist in the integration Font codes, Eclipse project and final user distribution (executable jar file)
3. A first version of the case library with at least 20 cases to be used as initialization of the system
4. Document describing the classes implemented and how have been integrated into the global tool
5. Document with results of tests showing the searches improved. A paper describing some case studies will be delivered as a reference. The system must reproduce those results. You will also receive a battery of tests to check in the Eclipse project.
6. New version of user manual

**PW3.4 - - Research and implementation in box-plot induced rules for cluster interpretation within an Intelligent Decision Support System tool (KLASS)**

KLASS contains a clustering module and several tools to postprocess the results of the clustering. In this work, a method to induce conceptual interpretations of classes is developed.

A previous version of KLASS will be delivered, including well-developed modules for:

* Boxplot based discretization
* Boxplot based induction rules
* Quality criteria of rules
* Evaluation of the quality of a knowledge base

Preliminar module for Conceptual Characterization by Embedded conditioning methodology.

A document with the development of a case study step by step will be provided as a reference.

Students must verify that current implementation is correct and correct eventual bugs

They must also extend the case study document including the other criteria implemented in KLASS in previous years and check they work properly

Evaluation of results will suggest a new criteria that keeps all advantages of the previous ones and avoids the cons

Students must discuss with Dr. Karina Gibert the design and conceptual model with detail

Students must deliver a ZIP file named as “PW34-IDSS-1112-FirstName-LastName of all authors”, in pendrive (not in the RACO, as it is too big), containing the following information:

1. Java Code of the implemented classes
2. New version of KLASS including the improvement. Dr. Karina Gibert will assist in the integration. Font codes, Eclipse project and final user distribution (executable jar file)
3. Document describing the classes implemented and how have been integrated into the global tool
4. Document with results of tests showing the searches improved. A paper describing some case studies will be delivered as a reference. The system must reproduce those results. You will also receive a battery of tests to check in the Eclipse project.
5. New version of the user manual