UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Intelligent Data Science and
Artificial Intelligence Research Center

INTELLIGENT DECISION SUPPORT SYSTEMS

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

Fall semester

Practical Work 3 (PW3, Teamwork)

Building an Intelligent Decision Support System

The objective of this exercise is to develop a *prototype* of an Intelligent Decision Support System in a concrete domain of application. The main steps that students must undertake are listed below.

Procedure

1. *Formation of the teamwork*. Each teamwork should be composed of 4 or 5 members.
2. Select which is the *domain of application* or *problem* where the IDSS will be constructed, and *identify the main decisions* to which the IDSS will give support. There are some possibilities like:
   a. Select one domain or scenario from the PW2 of one of the team members
   b. Select one domain from an open data repository (see list of websites available at the opendata documents in the course website), and identify a decision to be assessed using these data, so defining the associated *IDSS problem*.
   c. Select a new domain of application/problem which is interesting for all the members of the team. Ensure that it is *an IDSS problem*.

   For options a and c be carefull to think about a problem where data is available
3. Model and design the decisions you want to support with your system. It is interesting that the IDSS you propose contains at least 1 Data-driven model and 1 knowledge-based component
4. Identify the type of users of your system and the functionalities required for each of them. Example: Admin configurates the system, control users registration, Politician makes queries and receives result, Administrative Staff introduces data
5. Derivate the architecture of the IDSS as a particular case of the general architecture shown in class.
6. Obtain the *database/s, model-based techniques* and/or *expert knowledge* available for your problem.
7. Determine the software tools to be used (R, Weka, RapidMiner, etc.) and the

programming languages to be used (Python, Java, C++, etc.)

8. Design and realize the data preprocessing analyze the data: *pre-processing of the data*
9. Induce the different *data-driven models* (descriptive, discriminant, predictive, associative) from the data, for your IDSS or/and obtain *expert-based models* or *agent-based simulation models* or *qualitative reasoning models* or *model-based reasoning techniques* (*model- driven IDSS techniques*).
10. Test and validate the correctness of each model induced model.
11. Design the *user interface* of your IDSS and connect all modules properly , including *the induced or obtained models* into your system. Take care to introduce in the IDSS, the result of the data driven modelling process. Example: If you train a decision tree model, the result is a set of machine-readable rules, that can be evaluated in front of new data at production time.
12. Design 3 use cases or more that show the applicability of your IDSS to give support to the different decision-making processes of your domain of application.
13. Prove the performance of your system in the designed scenarios and prepare a demo.
14. *Evaluate the global Intelligent Decision Support System prototype* constructed.

Deliverable

A **ZIP file** labelled as "**PW3-IDSS-YearCourse-T#NumberOfTeamwork-TitleOfWork**", delivered **through** "**Racó de la FIB**" with the following content:

1. A folder named "**Documentation**" with a report containing:
   a. Description of the domain of application
   b. Main identified decisions
   c. Functional architecture of the IDSS prototype
   d. Data pre-processing summary
   e. Flowchart of the *data-driven IDSS model/s* gathering
   f. Data post-processing and validation
   g. Description of *model-driven IDSS techniques* used
   h. Description of the testing use cases.
   i. Evaluation of the global IDSS and conclusions
   j. Future work and improvements
   k. Gantt diagram with tasks planning
   l. Tasks assignment and responsibilities among teamwork members
   m. Time sheet, with hours devoted by each teamwork member to each task, and global accounting by each teamwork member
2. A folder named "**Data**" with the files with the original raw dataset/s or database/s and preprocessed ones used for *data-driven models*, both for training and for testing.
3. A folder named "**Models**" with the *data-driven models* or/and *model-driven techniques* used which can be visualized, read or interpreted in a nice way.

4. A folder named “**Source**” containing the <u>source code</u> of the scripts/macros/ functions used in the different software tools/languages used at training step.
5. A folder named “**Demo**” with a 3-5 minutes video with the demo.
6. A folder named “**Presentation**” containing the slides (up to 15) of the public presentationof the work:
    a. One title slide with the complete title of your work, your group number and namesof all members of the group and date.
    b. Several slides summarizing the report delivered.
    c. Be sure to include a slide with the kind of actors interacting with your IDSS.
    d. Be sure to include a slide with the architecture of your IDSS.
    e. Be sure to include a slide describing the 3 use cases tested.
7. A **README.txt file** specifying the structure and contents of the ZIP file.

Students must deliver the ZIP file on **D3.3**, through the Racó
The public communication of the contents of the PW3 and general discussion with all the students in the course will be done on **D3.3.**

Several items will be considered for the qualification of this work:

- The quality of the methodologyand work done.
- The documentation delivered,
- The quality of the oral exposition (both presentation and content assessed, as well as the ability to answer questions),
- The planning, coordination andmanagement of the team, and
- The individual evaluation of each student, including her/his integration level within the team group.

PW3 is due on D3.3 (Code & Documentation Delivery)
Presentation will be on D3.3 (Public Presentation & Discussion)