

AN EXPERT SYSTEM TO GENERATE STUDY GROUPS FROM PSYCHOLOGICAL AND ACADEMIC PROFILES IN HIGHER EDUCATION



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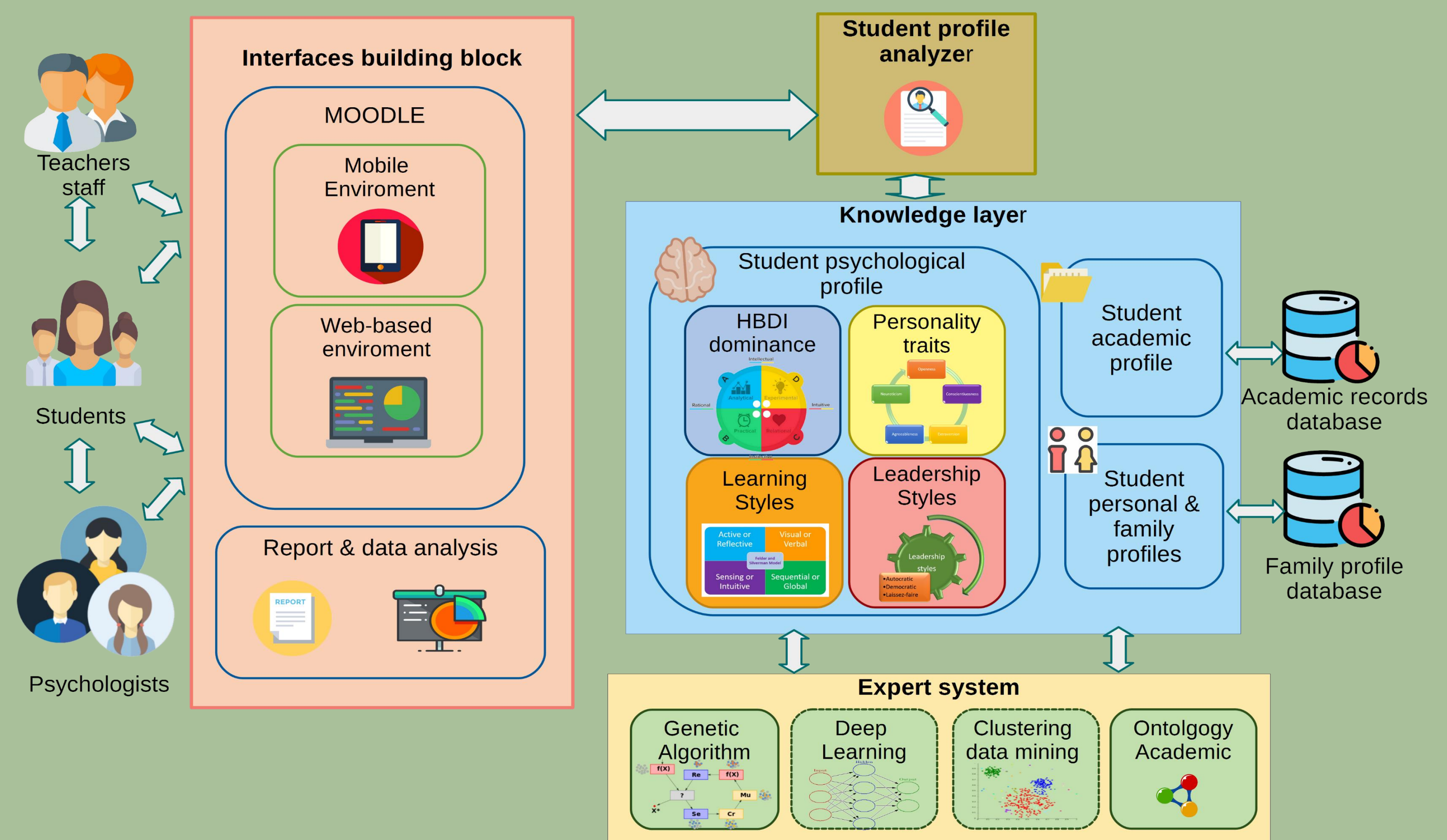


MOTIVATION OF THE WORK

- In Higher Education environments (physical or virtual), collaborative learning groups (CLG) have been to promote learning outcomes.
- Due to the dynamics of team work, maximizing the advantages of CLG requires forming groups based on the psychological and academic profiles of the students, as well as the characteristics of the task to be carried out.
- Organizing groups at random or by students' self-selection hardly ever results in balanced groups and best collective performance.
- Different types of Artificial Intelligence mechanisms, properly combined and trained, can be used to identify relevant attributes, matched to task features.
- Previous works have experimented with personality traits, learning styles, leadership features, ... separately, so the opportunity is there to study the combination.

THESIS OBJECTIVES

- Create versatile user profiles able to capture rich information about psychological and academic data.
- Automate the formation of effective CLG through a combination of genetic algorithms, deep learning and semantic web technologies.
- Design and validate a recommender system for CLG formation, with proper interfaces for teachers and psychologists to specify tasks, supervise outcomes and investigate criteria and requirements for group formation.
- Reuse the academic information generated by the students to improve their training processes.



RESEARCH PLAN

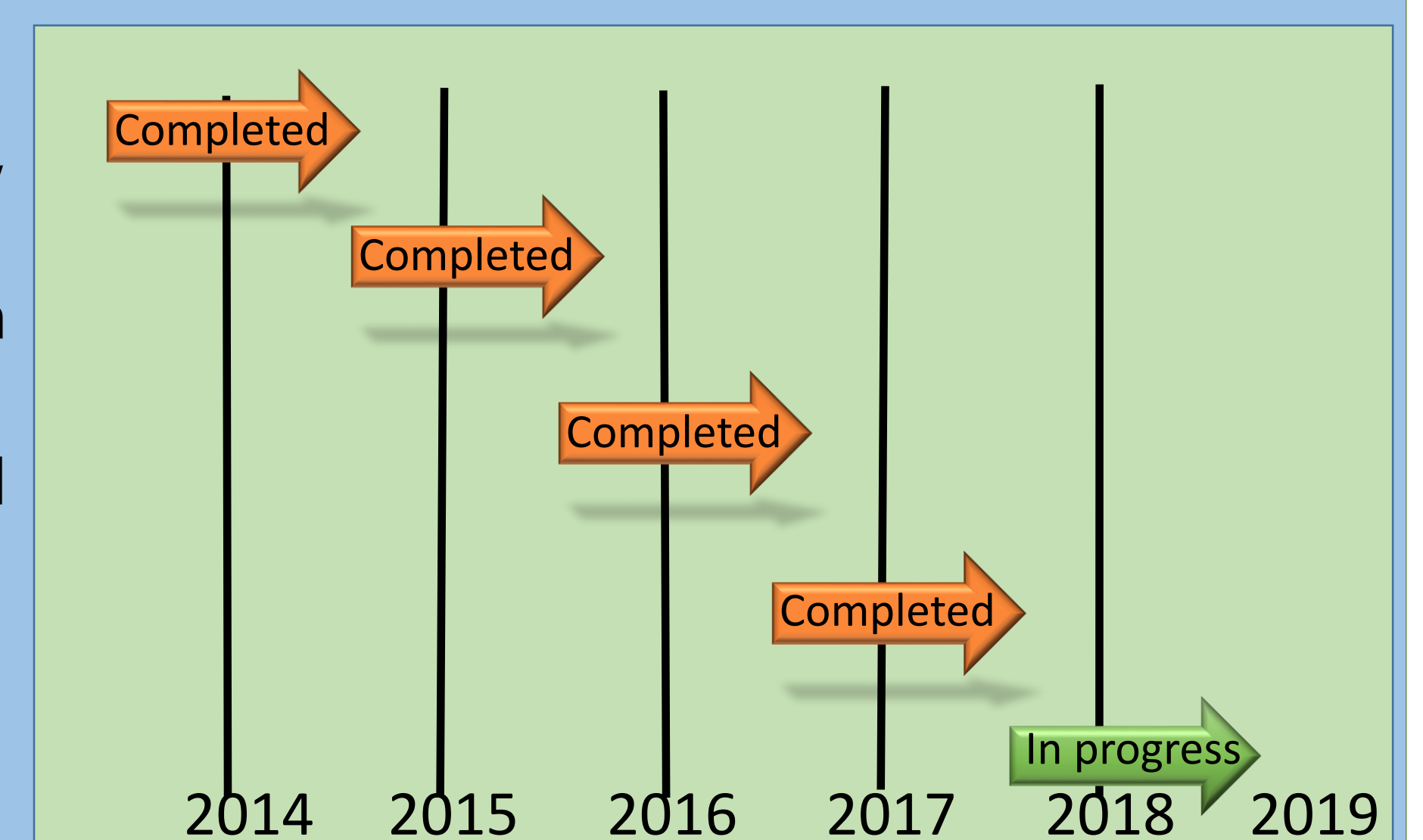
(2014-2015) Familiarization with the state-of-the-art in areas of semantic web, recommender systems, profile matching and sporadic social networks.

(2015-2016) First steps in the definition of affinity metrics and group formation strategies. Design of a demonstrator for CLG formation in online learning portals.

(2016-2017) Implementation and early experimentation in online language learning. Design and implementation of a second demonstrator for group experiences in Higher Education.

(2017-2018) Completion of proposals evaluation of second demonstrator. Development and evaluation.

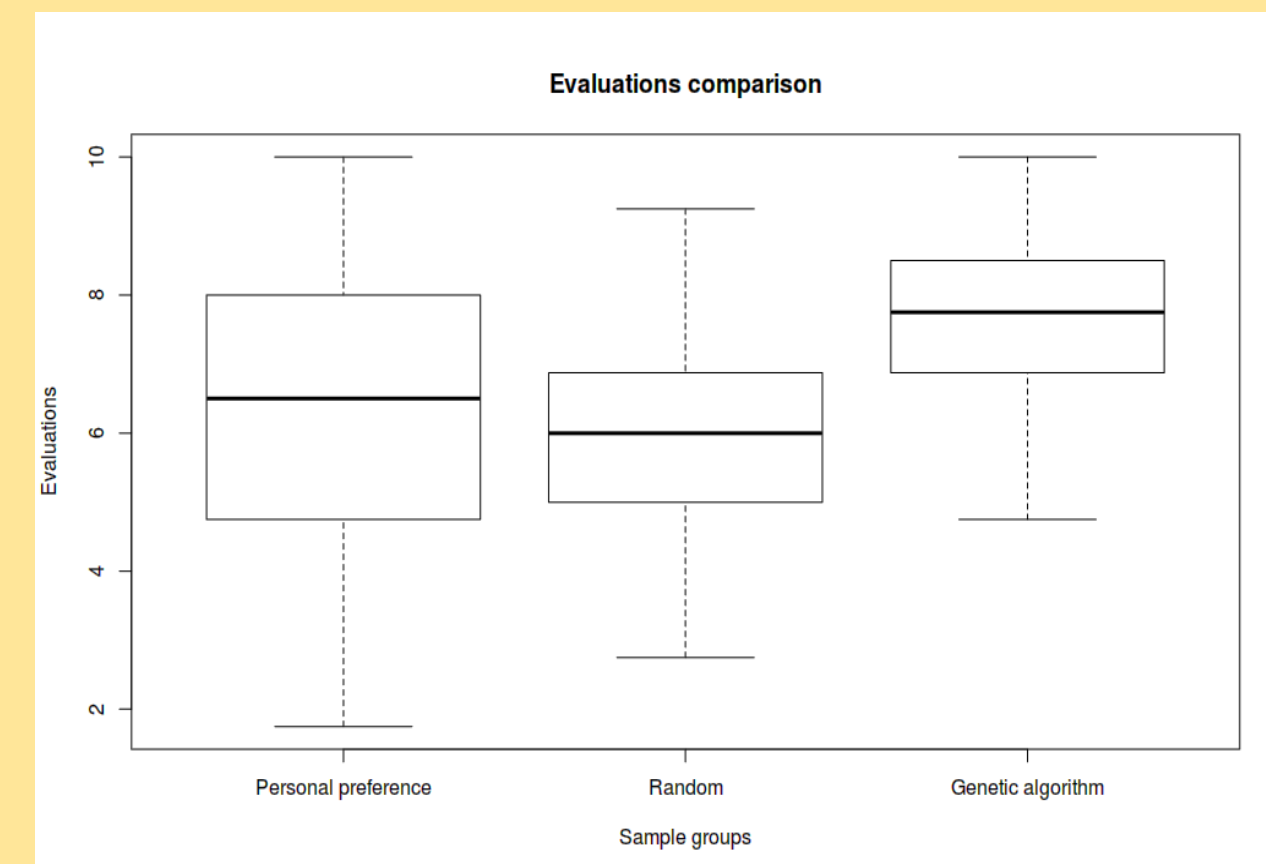
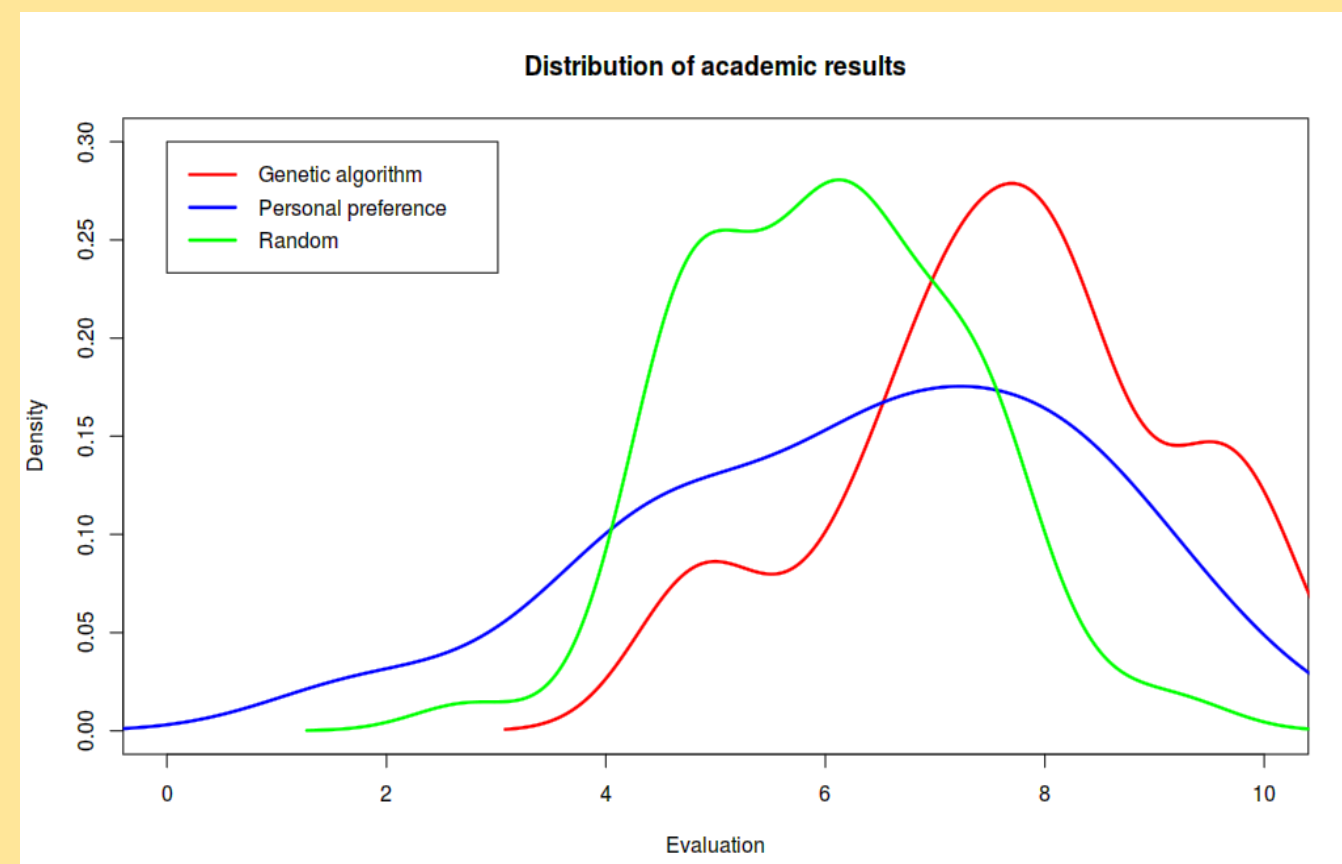
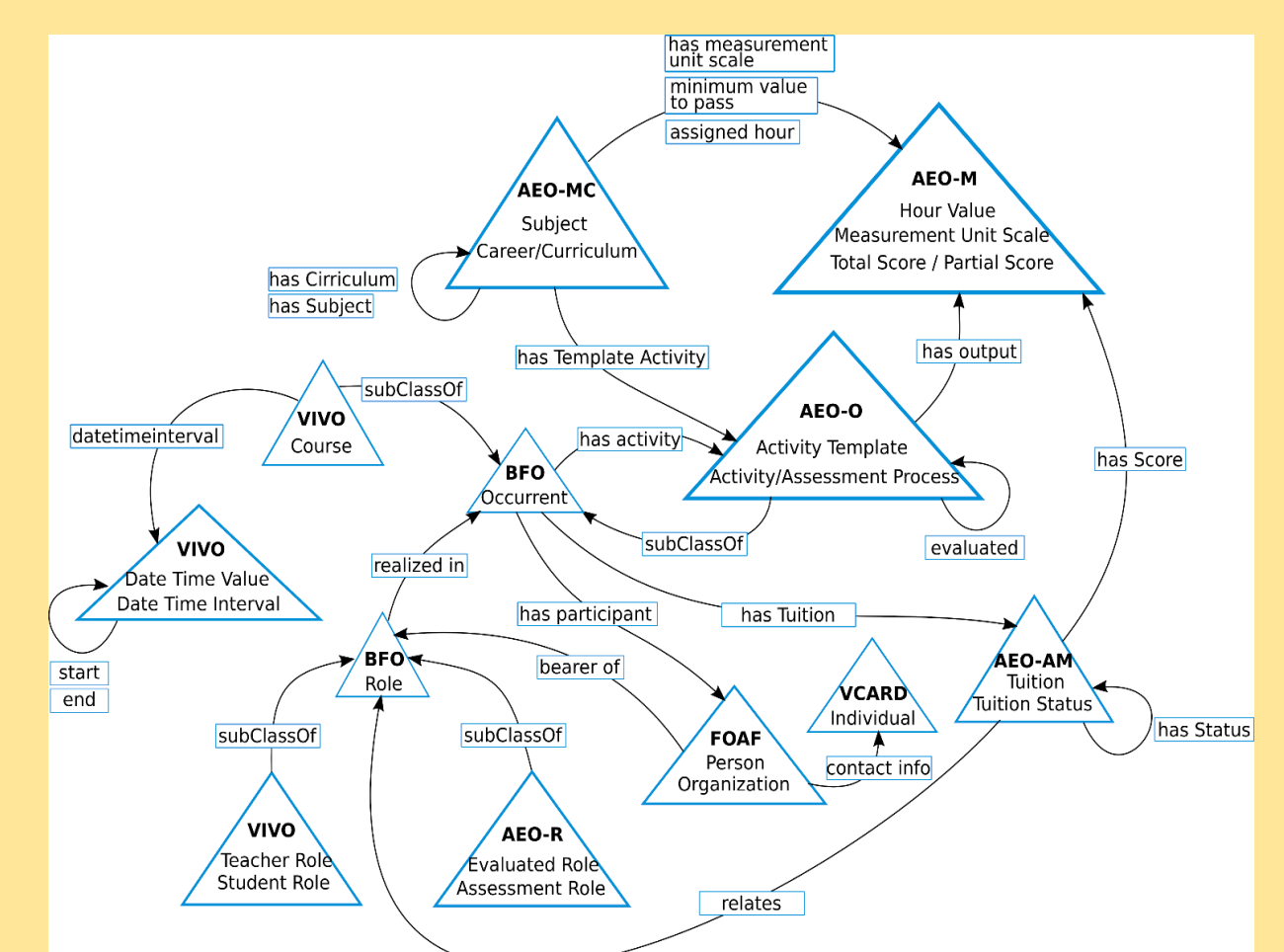
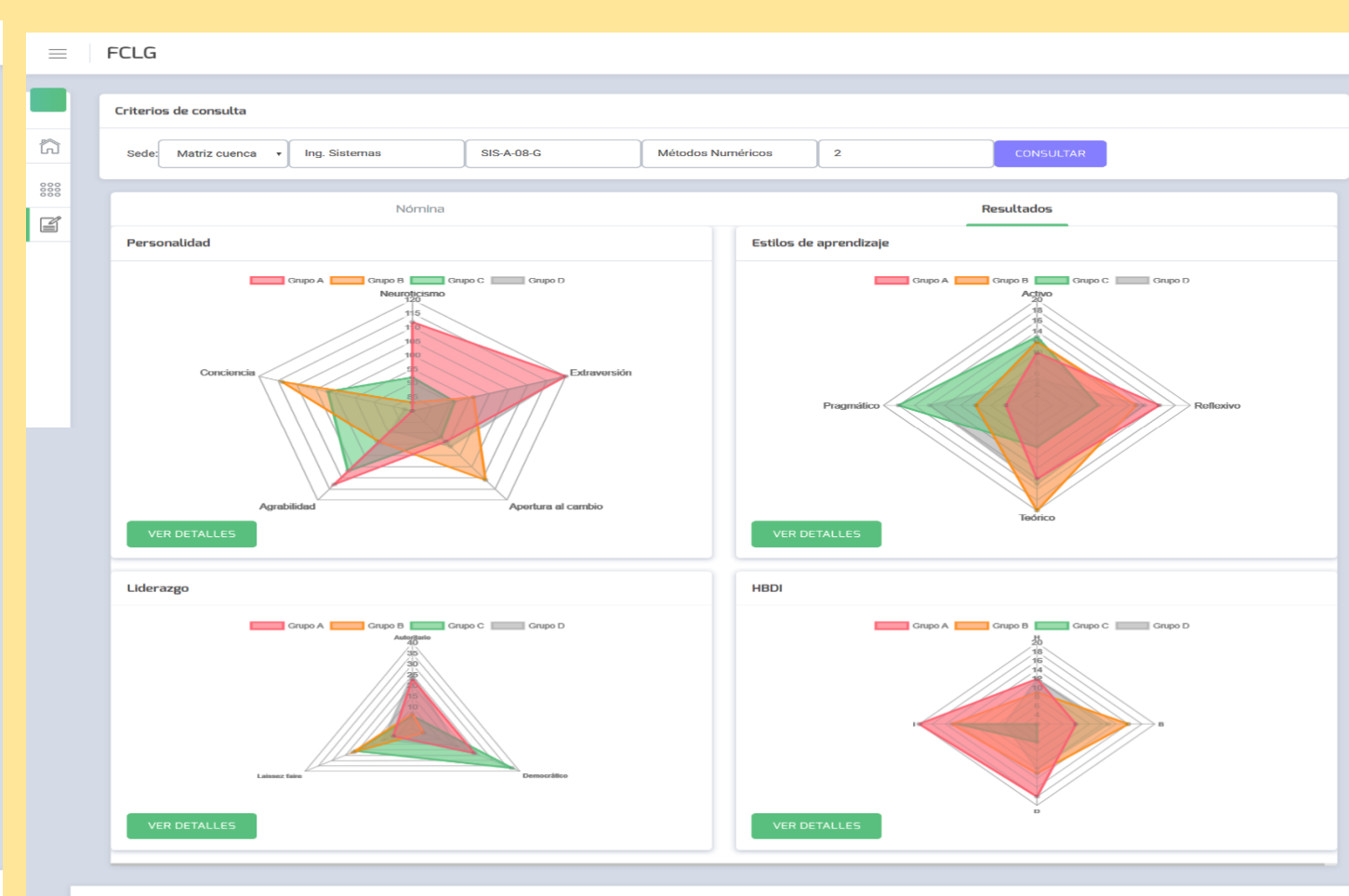
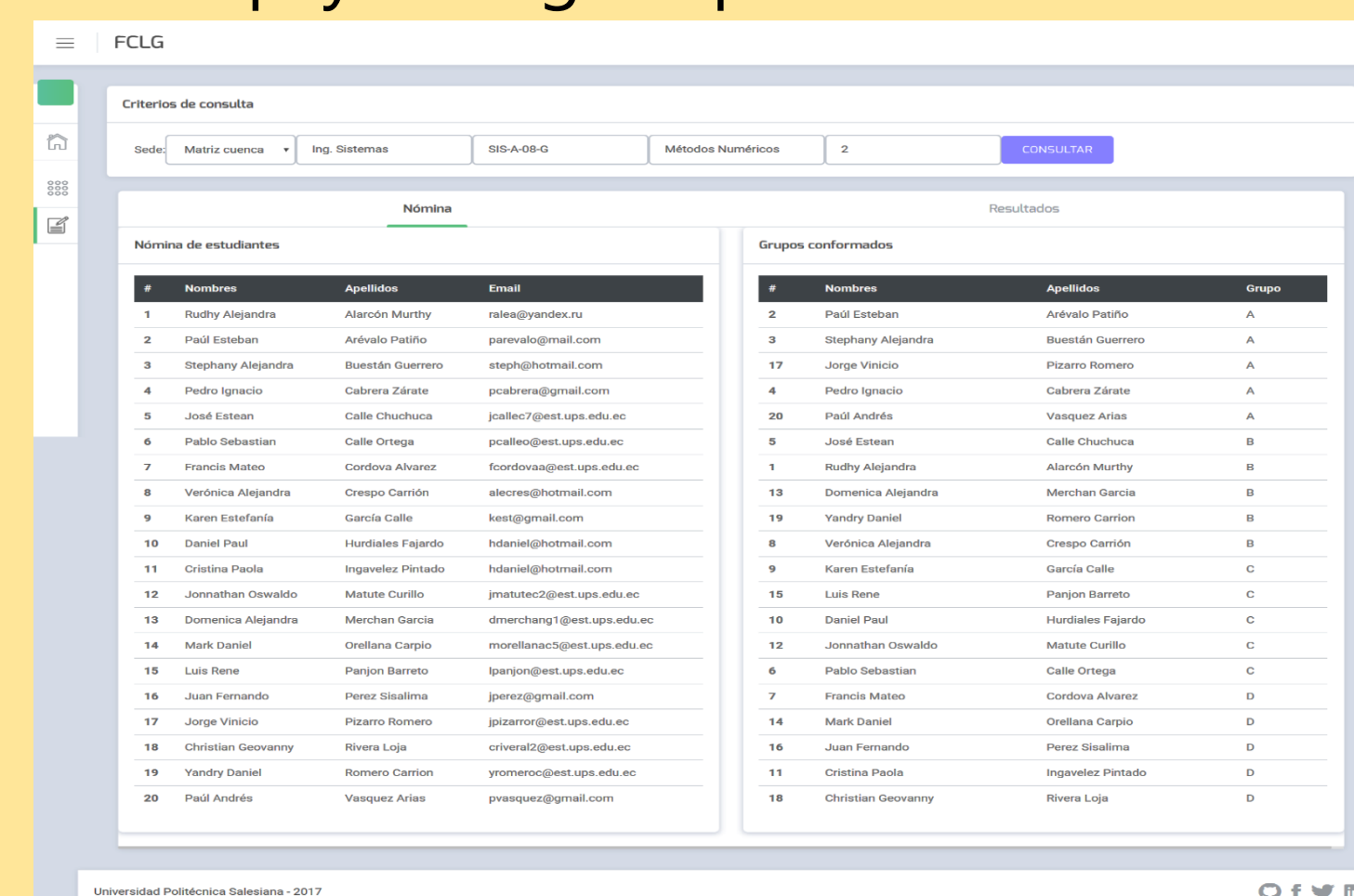
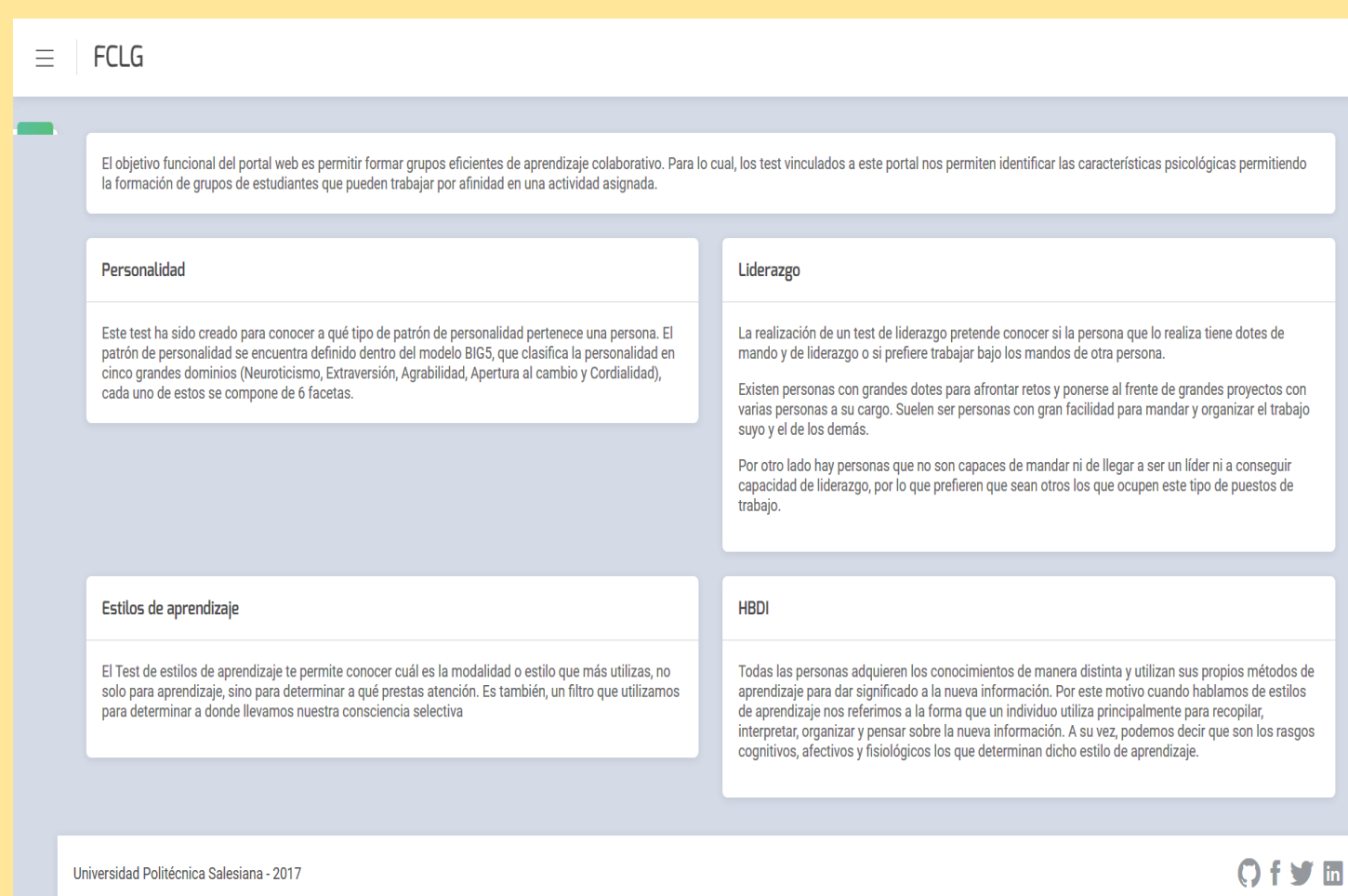
(2018-2019) Documentation and thesis presentation.



RESULTS & DISCUSSIONS

The following tools have been developed:

- 1 ontological system with proper frontend tool to manage the rich user profiles employed by the other tools.
- 4 tests (designed with the aid of experts) to gather information from which psychological profiles can be derived;
- 2 genetic algorithms to create CLGs based on personality traits and the Herrmann Brain Dominance Instrument (HBDI);
- 1 tool for data visualization based on students' psychological profile.



We carried out a pilot experiment in a higher education institution, with the participation of 126 students cursing numerical methods subject.

The results confirm that:

- Students grouped based on personality traits perform best as compared to randomly-assigned or personal-preference groups.
- Considering compatible personality traits further improves group performance
- The software tool developed can be a viable grouping technique to forming effective CLG.

NEXT YEAR PLANNING

- Inclusion of more specific factors related to performance and incorporation in the recommender system.
- Development of neural networks to learn from learning outcomes and fine-tune the parameters of the CLG formation algorithms.
- Integrate the new profiles and the CLG formation algorithms with the Moodle platform.

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- [2] A. H. Cherif, D. Jedlicka, S. Verma, K. Uddin, and F. Movahedzadeh, "Brain Talking : Classroom activity to engage students in deep and meaningful learning," J. Educ. Pract., vol. 8, no. 32, pp. 156–174, 2017.
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