APPLICATION OF LEARNING ANALYTICS TECHNIQUES ON BLENDED LEARNING ENVIRONMENTS FOR UNIVERSITY STUDENTS

Sheila Lucero Sánchez López
Supervised by: Rebeca P. Díaz Redondo, Ana Fernández Vilas
Affiliation: ICLab Information & Computing Lab, Department of Telematics Engineering (University of Vigo)

Motivation of the work

The emergence of E-Learning platforms is changing not only distance education but also face-to-face education. One of the biggest challenges when talking about educational platforms is the testing and dissemination of knowledge.

Unfortunately, these platforms do not provide specific tools to allow educators to thoroughly track and assess all learners' activities while evaluating the structure and contents of the course and its effectiveness in the learning process [1].

Currently, it is innovating the learning process with various techniques, but has not been able to measure the degree of learning acquisition.

Objectives

The main objective of this thesis is the research and application of learning analytics techniques for prediction and prevention of failure and dropout of students at university level under the blended-learning training model.

E-learning platforms store in its databases information about the actions of teachers and students, thus generating large volumes of data, Big Data. This is the reason to apply techniques of learning analytics for further analysis in order to learn more about the learning process.

To improve the training process, allow early detection of deficiencies in the process of teaching and learning and support the commitment of students to acquire the skills and abilities needed to successfully overcome the academic year.

Research Plan

The research has two stages: the first one is the collection and processing of data and the second one is the application of learning analytics techniques.

First Year

- ☑ Analyze the state of the art in learning analytics.
- ☑ Literature review and knowledge about the environment (Learning Analytics, E-Learning, Educational Data Mining, Learning Process, etc.).
- ☑ Initial analysis of the data obtained from the E-Learning platform(faiTIC).
- ☑ Use "classic" statistical techniques (clustering, time series, etc...) to study the relationships between student behavior on the platform with their final grade.
- ☑ Analyze learning analytics techniques to select the best option. Implement a classification algorithm of students based on the interaction of students with the e-learning platform of UVigo.

Next Year Planning

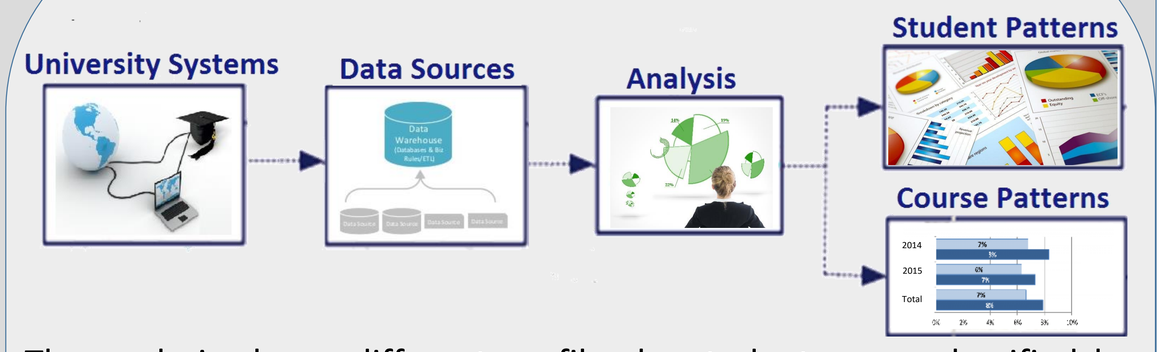
Second year

- ☐ Apply an experimental methodology that combines learning analytics techniques in the field of data analysis (spatio-temporal clustering and classification techniques) with technological contributions.
- ☐ Improve the classification algorithm of students and subjects in order to predict performance.
- ☐ Detect the different learning processes to improve the designs of continuous assessment.

Third Year

- ☐ Validate the studies explained above with real data coming from the University of Vigo. Specifically, we use a dataset from the e-learning platform faiTIC.
- ☐ Develop some plugins of the e-learning platform to put into practice the studies and algorithms developed.
- ☐ Thesis paper preparation and dissemination of global results in prestigious international forums in the field.

Preliminary Results

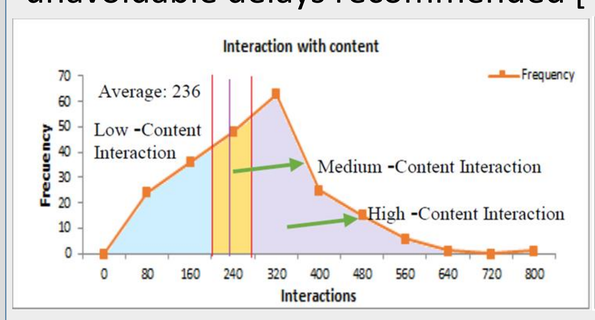


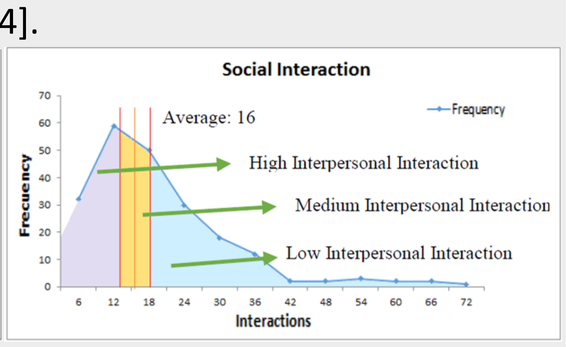
The analysis shows different profiles by student group classified by their final grade[2].
We propose a new taxonomy for classifying students of 9 quadrants based on Bento's taxonomy[3].

Social \ with Content	LCI	MCI	HCI
HII	Quadrant III	Quadrant VIII	Quadrant IV
MII	Quadrant VI	Quadrant V	Quadrant IX
LII	Quadrant I	Quadrant VII	Quadrant II

Having to:
HII.- High Interpersonal Interaction
MII.- Medium Interpersonal Interaction
LII.- Low Interpersonal Interaction
HCI.- High-Content Interaction
MCI.- Medium-Content Interaction
LII.- Low-Content Interaction

We calculate the daily frequency of interactions for both classifications (social and with content). Then, we define the threshold (± 15% of average) because it is the margin of tolerance for fatigue and unavoidable delays recommended [4].





We obtain the next distributions per Quadrant.

RESULTS BY OUR CLASSIFICATION (9 QUADRANTS)

Quadrant	All	Dropout	< 3	3 to 6	>6
Quadrant I	31%	94%	52%	18%	2%
Quadrant II	8%	0%	2%	11%	16%
Quadrant III	3%	0%	3%	4%	2%
Quadrant IV	22%	0%	5%	27%	42%
Quadrant V	6%	0%	2%	11%	7%
Quadrant VI	3%	6%	7%	0%	2%
Quadrant VII	11%	0%	16%	7%	13%
Quadrant VIII	8%	0%	8%	9%	7%
Quadrant IX	9%	0%	5%	13%	9%

References

[1] M. E. Zorrilla, E. Menasalvas, D. Marin, E. Mora, and J. Segovia, Web usage mining project for improving web-based learning sites, In Web Mining Workshop (2005), 1–22.
[2] C. González, S. Sánchez, R. Díaz, A. Fernández, " Will I pass the course? performance analysis based on time series " (under review CIINDET 2016).
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[4] J. Caldera, M. Madriz, A. Gómez, F. Quintana, O. Marcano y D. Flores, Estudio de tiempo para mejorar el proceso productivo, Guayana: Ministerio del Poder Popular Para la Educación Universitaria, 2013.