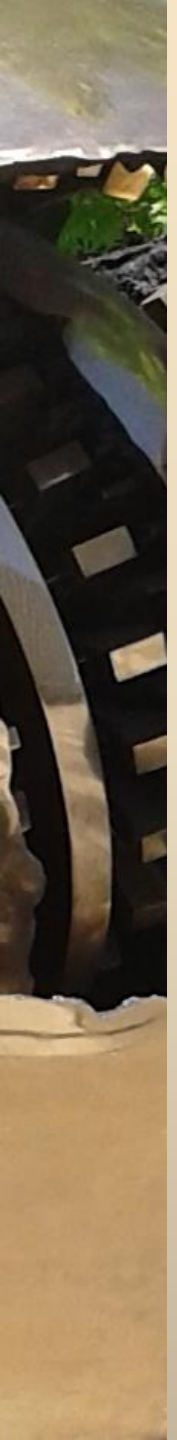

International Conference on Applied Mathematics & Computational Science
Venice, Italy, March 21-23, 2020

Software Architecture for Adaptation and Recommendation of Course Content and Activities Based on Learning Analytics

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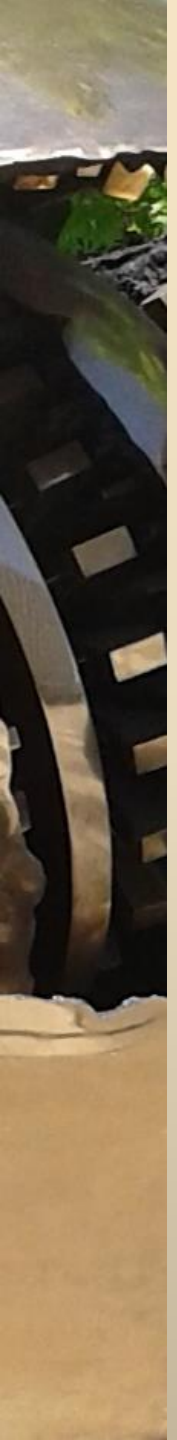
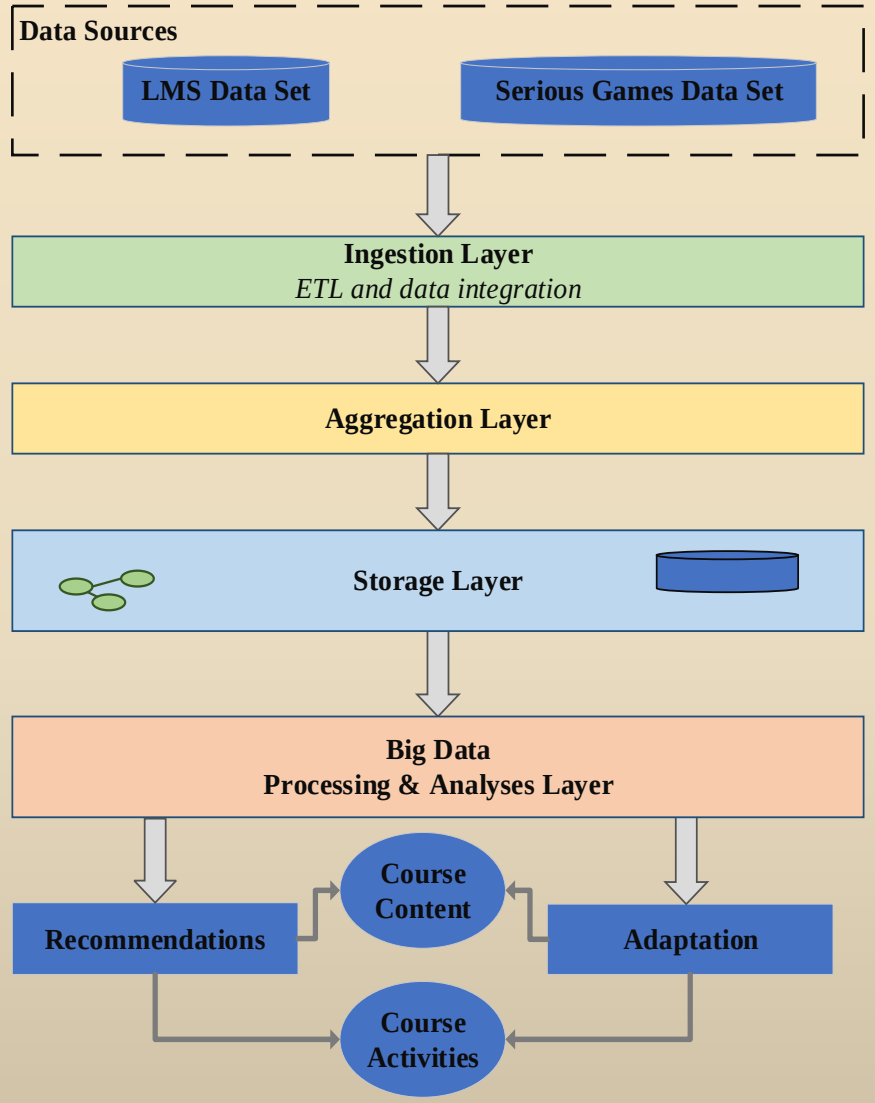
Sofia, Bulgaria

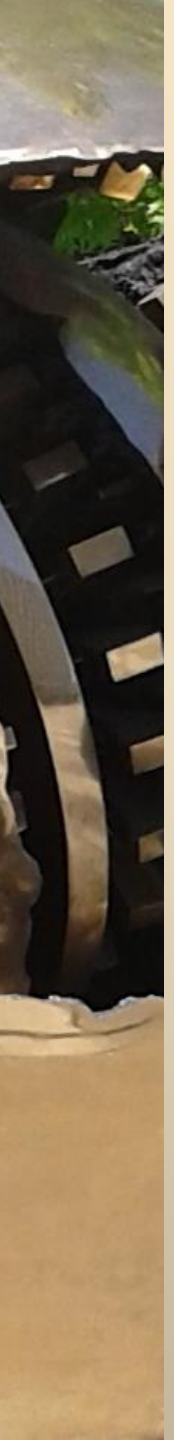


Paper's Goal

- to create a model of most used student and teaching activity in order to help the teacher build adaptation and recommendations a course content or flow of course activities.
- to propose the architecture and evaluate the learning process using framework.



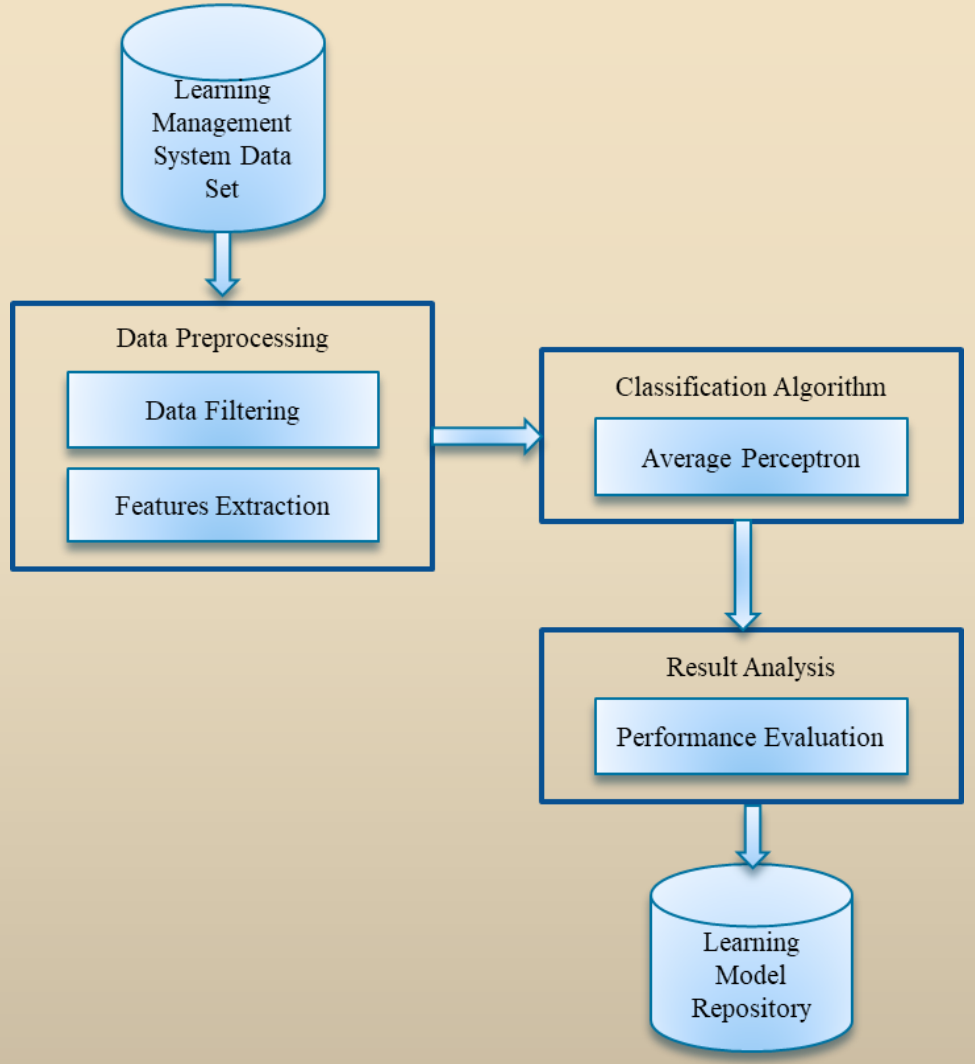
Software architecture for adaptation and recommendation of course content and activities based on learning analytics

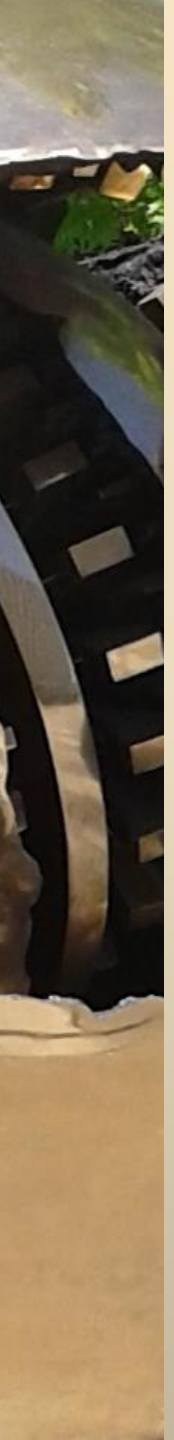


Algorithm for Student Learning Prediction Based on Machine learning

- Issue 1: Missing and / or incomplete data, as well as correcting them
- Issue 2: Data of different scale and range and their normalization
- Issue 3: Corrupted, conflicting and misleading data
- Issue 4: Categorical data

Algorithm for student learning prediction based on machine learning





Data Set Selection and Preprocessing

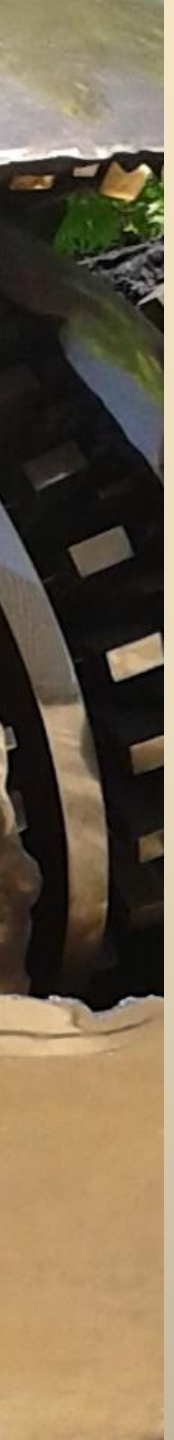
Learner significant elements:

- Course module viewed
- Course viewed
- Discussion viewed
- Grade user report viewed

Teacher significant elements:

- Item created
- Course module created
- Course module updated
- Activity report viewed
- User list viewed
- User profile viewed

No	Original Value	Formatted Value
1	Course module viewed	0
2	Course viewed	1
3	Discussion viewed	2
4	Grade user report viewed	3
5	Item created	4
6	Course module created	5
7	Course module updated	6
8	Activity report viewed	7
9	User list viewed	8
10	User profile viewed	9



Example of original unformatted data set

"2/11/19, 11:15",Course: Programming Languages,System,Course viewed,The user with id '7160' viewed the course with id '49'.,web,193.57.20.13

"3/11/19, 11:32",File: Lection,File,Course module viewed,The user with id '2' viewed the 'resource' activity with course module id '708'.,web,212.5.158.162

"3/11/19, 11:32",Course: Programming Languages,Activity report,Activity report viewed,The user with id '2' viewed the outline activity report for the course with id '49'.,web,212.5.158.162

Example of CSV formatted data input after encoding

Course: Programming Languages, System, 1, web

File: Lection, File, 1, web

Course: Programming Languages, Activity report, 7, web

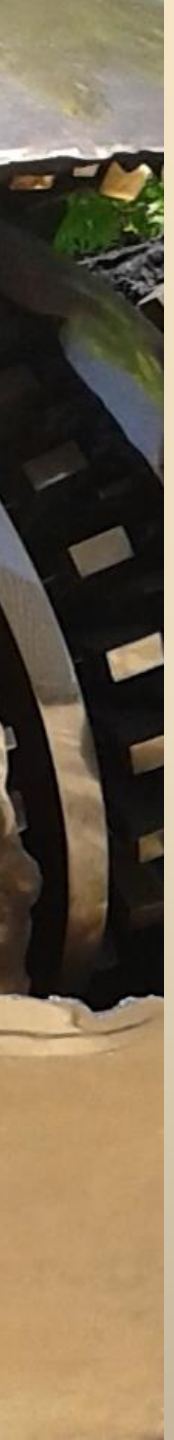
Data Set Processing

- The accuracy calculating formula

$$Accuracy = \frac{Number\ of\ \ correct\ \ predictions}{Total\ number\ of\ \ predictions\ made}$$

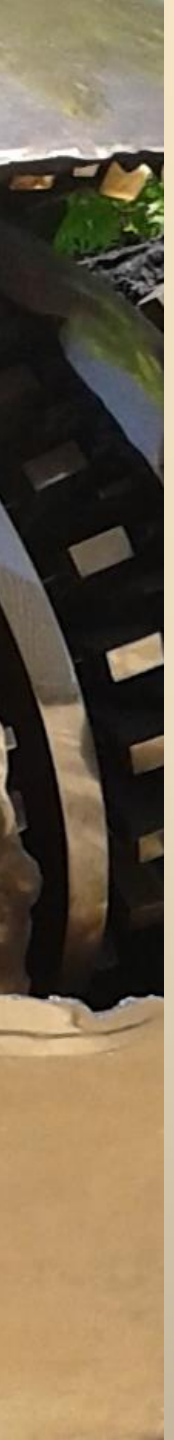
- The measured results for accuracy with the selected features set

Number of Attributes	Features set	Best Accuracy
4	{Event context, Component, Origin, IP address }	88.01%



CONCLUSION AND FUTURE WORK

- Proposed software architecture for adaptation and recommendation of course content and activities based on learning analytics
- The proposed algorithm for student learning classification have been implemented by using Averaged Perceptron method
- The experimental data set is obtained from learning management system and contains of 63774 instances characterized by 7 attributes.
- Based on different analytical models which created after execution of the feature extraction and data set reduction process, the prototype will be validate and verification the usability of the proposed architecture.



Thank you!

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