

A CASE STUDY FOR ANALYSIS AND PREDICTION IN LEARNING USING A PEER LEARNING SYSTEM

ADELINA ALEKSIEVA-PETROVA AND MILEN PETROV

Problems

- Usage of different systems which define the learning environment as a technology model
- Collection of data from systems that could use for:
 - different analyses of student achievements or problems
 - predict student needs and behaviors which teachers could be used to improve the learning process and outcomes.

Paper goals

To investigate the possibility of using systems learning data:

- for the analysis of learner preferences
- to predict different outcomes which could be used in the learning environment

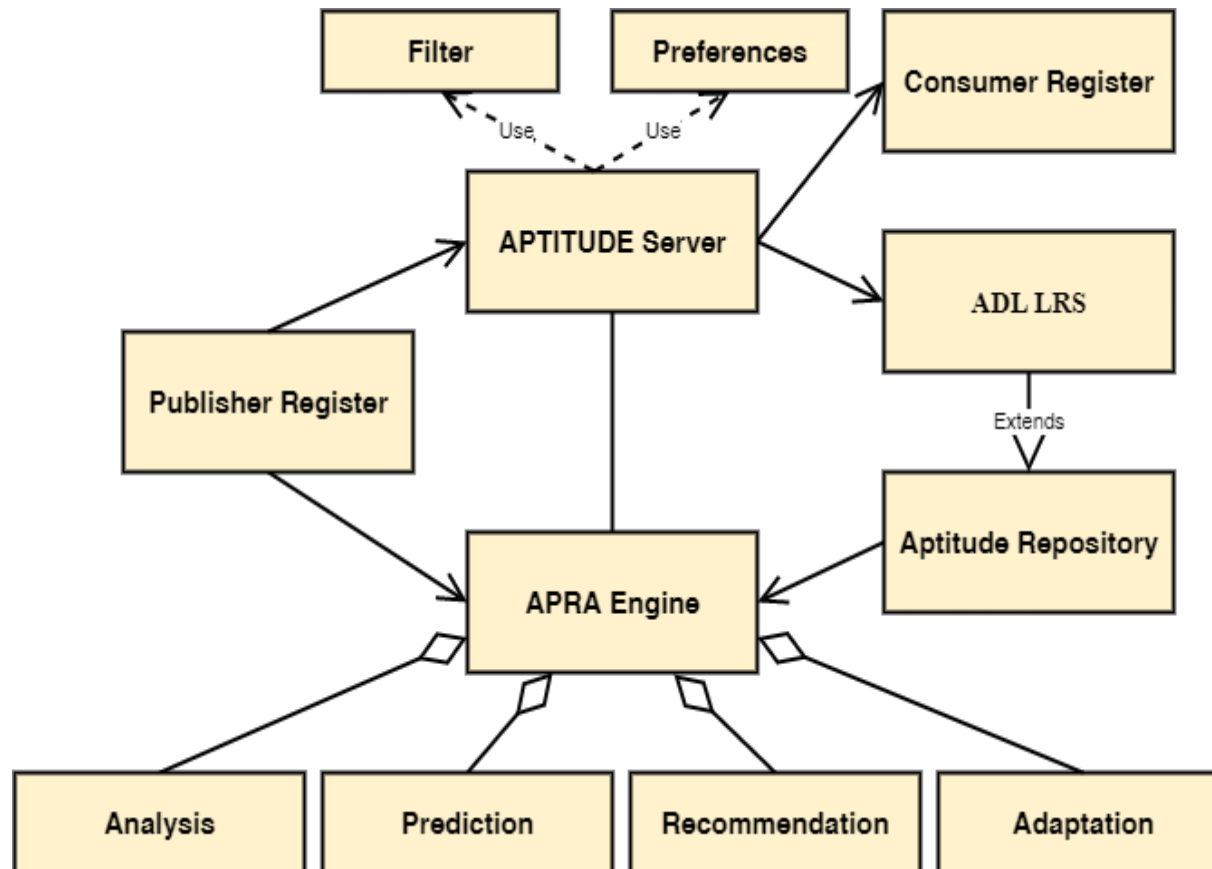
APTITUDE Project

To design and implement a flexible platform which supports recommendation and adaptation of learning contents and activities in education based on learning analytics from different systems, tools and services.



<http://aptitude.w3c.fmi.uni-sofia.bg/>

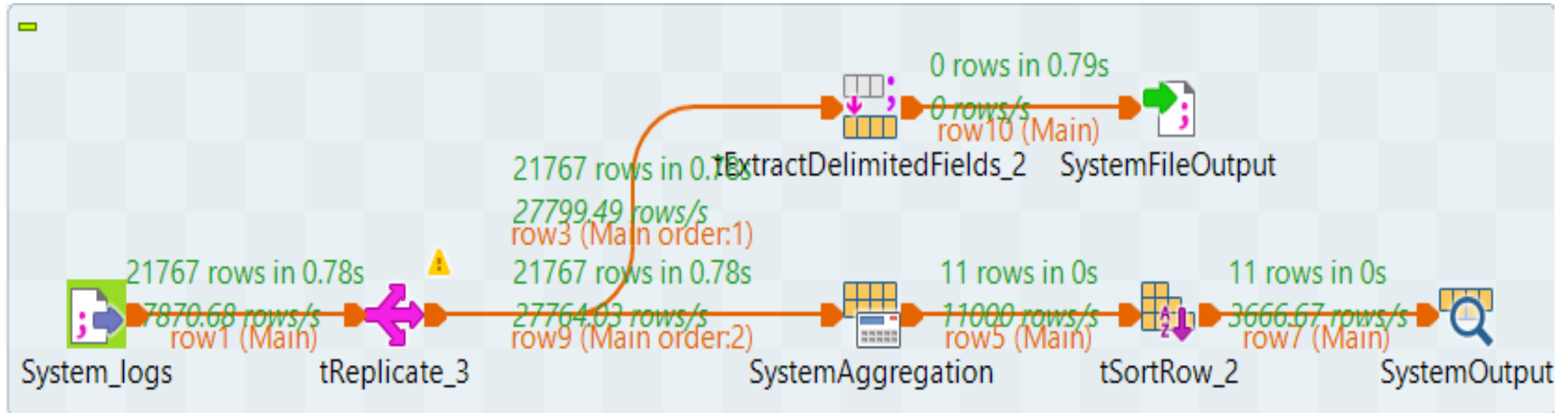
Meta model of Aptitude framework



Case Study Description

- Students in the last semester of the academic year 2021/2022 in the Web technologies course at Sofia University for a bachelor's degree in Software Engineering.
- Publisher Register – a peer learning system: peer review and peer assessment as a subset of the peer learning process.
- Simulation of two components from the APRA Engine using the system log file in two directions:
 - Analysis process;
 - Prediction process.

Workflow for the Analysis process

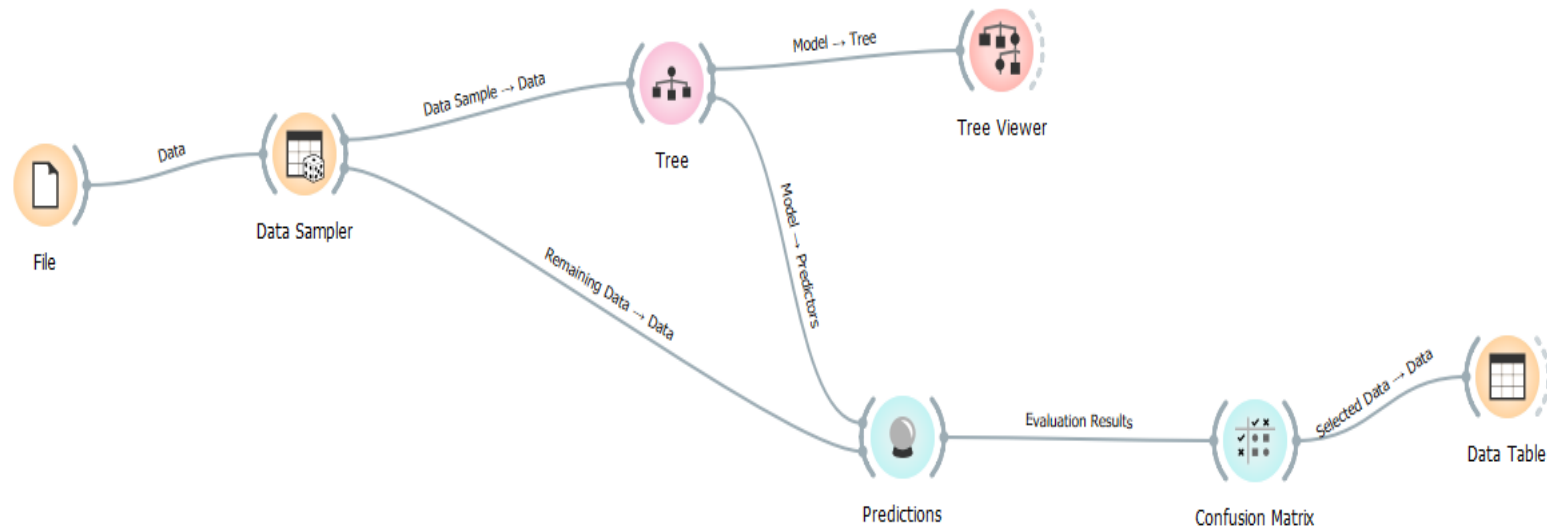


Experimental data results

SystemOutput	
description	StudentCount
Chrome	16353
Firefox	2091
Opera	1406
Edge	1113
Safari	415
Facebook App	344
Mobile Safari UIWebView	25
Ecosia	11
IE	3
Miui Browser	3
Samsung Browser	3

```
Starting job SystemReferats at 11:11 28/06/2022
[statistics] connecting to socket on port 3718
[statistics] connected
welcome|4803
history|2863
system|2760
referat/81762_1_3      |381
referat/81760_2_4      |234
referat/81868_1_68     |229
referat/81842_1_79     |157
referat/9999_1_0       |154
referat/81805_7_140    |153
referat/81932_2_174    |148
referat/81883_2_38     |138
referat/81862_1_115    |137
referat/81933_2_5      |128
referat/81850_1_141    |125
referat/81848_2_58     |124
referat/81360_11_46    |116
```


Workflow for the Prediction process



Confusion matrix

Precision, Recall, and F1 of the model: 0.987

		Predicted									Σ
		Android	Linux	Mac OS X	Ubuntu	Windows 7	Windows 8.1	Windows 10	iPad	iPhone	
Actual	Android	205	0	0	0	0	0	0	0	0	205
	Linux	0	492	1	0	3	0	23	0	0	519
	Mac OS X	0	3	617	1	0	0	20	0	0	641
	Ubuntu	0	0	0	160	0	0	0	0	0	160
	Windows 7	0	0	0	0	101	0	4	0	0	105
	Windows 8.1	0	0	0	0	0	25	7	0	0	32
	Windows 10	0	2	4	1	0	0	3724	0	0	3731
	iPad	0	0	1	0	0	0	0	6	0	7
	iPhone	0	0	0	0	0	0	0	0	41	41
	Σ	205	497	623	162	104	25	3778	6	41	5441

Conclusion

- the validation of the Analysis and Prediction components
- the data from the peer learning system is investigated to create a model for prediction
- the limitation of the work: the collected parameters (variables) for every log record are too limited to provide a more meaningful conclusion
- to produce such results, it needs external labeling of the essays.
- future work: to enrich the number of parameters and make colorations between them.

Acknowledgements

The research reported here was funded under a project entitled “An innovative software platform for big data learning and gaming analytics for a user-centric adaptation of technology-enhanced learning (APTITUDE)” by the Bulgarian National Science Fund with contract No: KP-06OPR03/1 from 13.12.2018.

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- Adelina Aleksieva:
aaleksieva@tu-sofia.bg
- Milen Petrov
milenp@fmi.uni-sofia.bg