Enhancing Moodle with External Data Integration: A Case Study at the University of São Paulo

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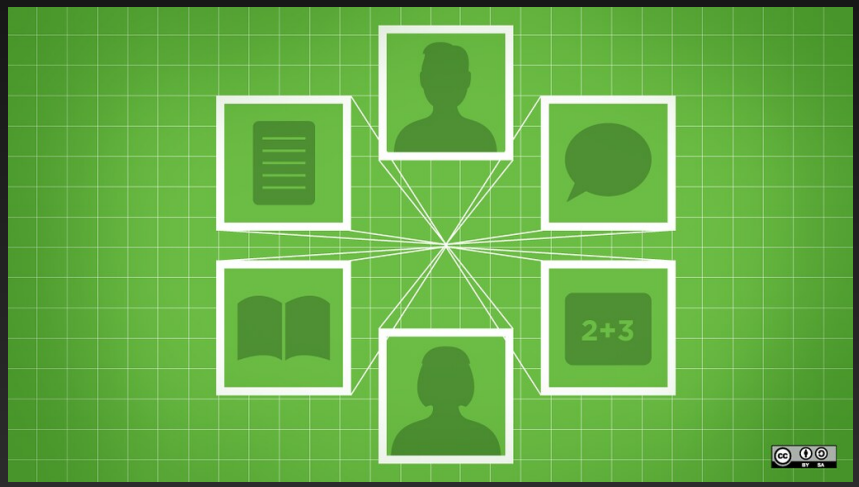
Outline

1. Introduction
   - Context
   - Research Questions
2. Methodology
3. Discussion
4. Conclusion

Introduction

In response to the increasing demand for advanced learning analytics in educational settings, this project proposes a discussion



https://www.flickr.com/photos/opensourceway/8288335386/

on ways to enrich the information available about learners in the Moodle learning management system by incorporating external data sources. [Lang et al., 2017]

Context

At **University of São Paulo**, we are constructing a dashboard in Moodle to display the results of some predictive models, such as the probability of dropout in a course.

https://commons.wikimedia.org/

To achieve this, we utilize the built-in Moodle **Analytics API**, which considers **Indicators** as independent variables and the **Target** as the dependent variable.

Context

Moodle comes with default indicators and targets, and it is possible to extend its classes to define custom indicators and targets based on Moodle data.

`https://moodle.org`

However, we aim to incorporate external data into Moodle to be used as additional indicators and targets.

Research Questions

1. **What kind of external data can be usefully and safely integrated with the Moodle (behavioral) data?**

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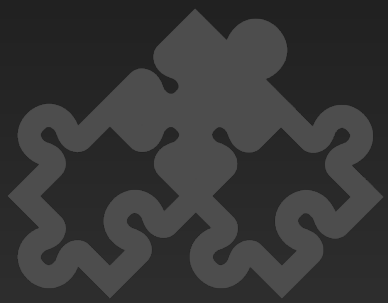
2. **How this enriched data can be used as features for statistical and Machine Learning models (to be presented in dashboards) respecting privacy and student autonomy ?**

Methodology

Our approach is to create a Moodle plugin with the following capabilities to handle our Research Questions:



1. **Plugin tables for storing external data locally**
2. PHP routines to populate external data into plugin tables
3. New Indicators and Target classes that use the data stored by the plugin
4. A page or a block for building the dashboard

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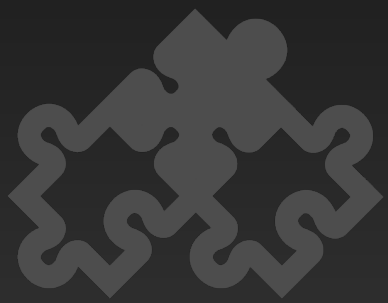

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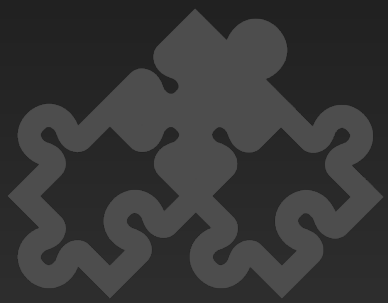

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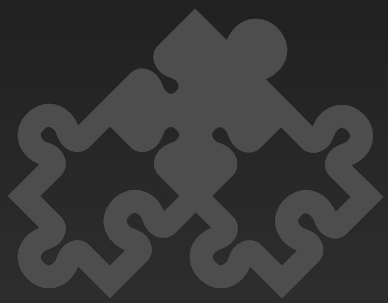

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Information Systems

Some data stored in external University Information Systems:

- **Academic History**
- Admission information (social/racial quota, entrance exam results)
- Student Aid and Scholarships
- Address (time spent in commuting)
- Gender
- Race
- Socioeconomic data
- Frequency of book checkouts at University Library
- Employment status (whether the student has an external job)

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Discussion

Storing sensitive student data, as in the previous case, requires careful consideration of data security and privacy (in human rights sense). Some possible issues:

- **Compliance with Regulations: Ensure compliance with data protection regulations, such as GDPR, LGPD (Brazil), or other relevant laws**
- Access Control
- User Consent, Transparency
- Secure Coding Practices

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Software Engineering

Some issues this approach brings to software engineering:

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- **The possibility for each student to choose their own indicators requires rebuilding the model many times, which can impact performance**

Conclusion

This is a work-in-progress project where we propose to place students in the role of decision-makers to gather insights from prediction models.
Moreover, students will decide what data should be included or excluded from the model.
This approach involves addressing several software engineering issues.

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Conclusion

Thank you!

Bibliography


Lang, C., Siemens, G., Wise, A., & Gasevic, D. (2017). *Handbook of learning analytics*. SOLAR, Society for Learning Analytics and Research New York.