AI for Education: From Predicting Student Performance to Recommend Educational Resources

IA3 Group

28 of February of 2024

ALEX MARTÍNEZ-MARTÍNEZ

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01 My Context

Who am I?

Background
- Computer Science Degree (2017 - 2021)
- Masters in Intelligent System (2021 - 2022)
- Ph. D. (2022 -) → ValgrAI Scholarship

Research
- Student Performance (ML and DL)
- Indoor positioning
- Game AI
- Recommender Systems (Currently working)

Interests
- AI
- Virtual and Augmented Reality
- Quantum Computing

02 e-DIPLOMA

Current Learning Situation

Teacher centered approach in the majority of cases

Limits how students can interact with each other and with the teacher

Regular lectures may not be enough to excite students

Access to some learning resources can be difficult for some students

E-learning Paradigm

Gathers a larger number of students

Use of emerging digital tools to improve engagement and learning experiences

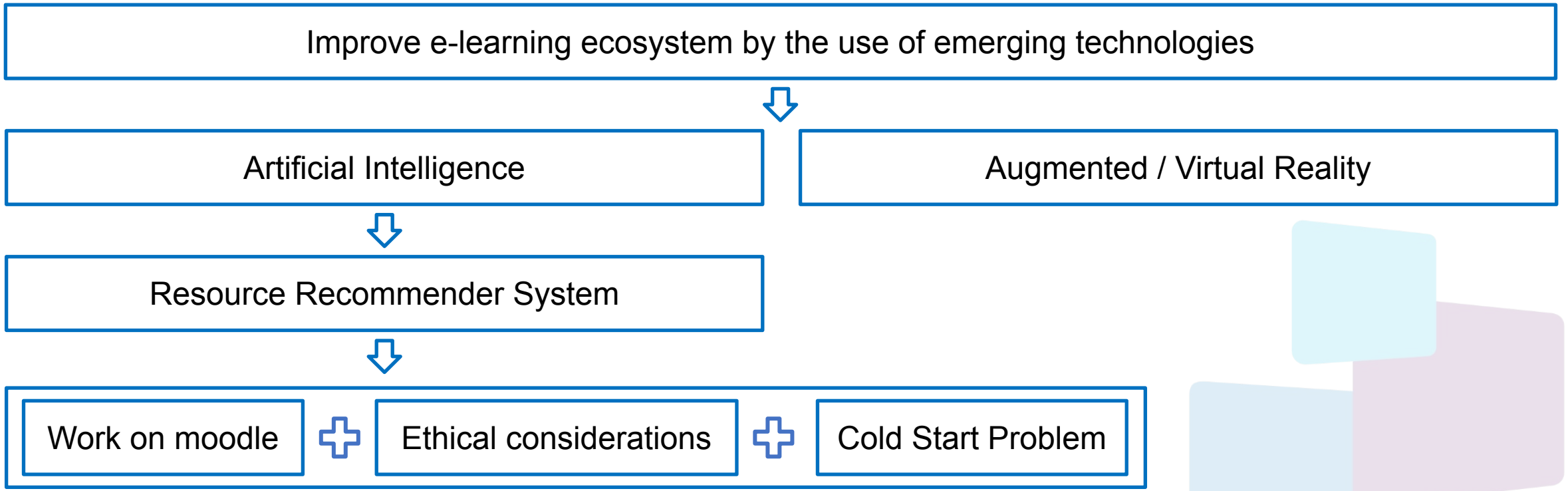
Easy access to a massive amount of virtual resources

Teachers can not reach every student

High dropout rate

Students' specific needs may not be covered

e-DIPLOMA Project



03 Student Performance

Challenges and Objectives

Teachers can not reach every student

High dropout rate

⇒

It may be helpful to have a tool that indicates those students who are at risk

Predict the result / performance of the students

⇒

Using only interaction data generated by the students

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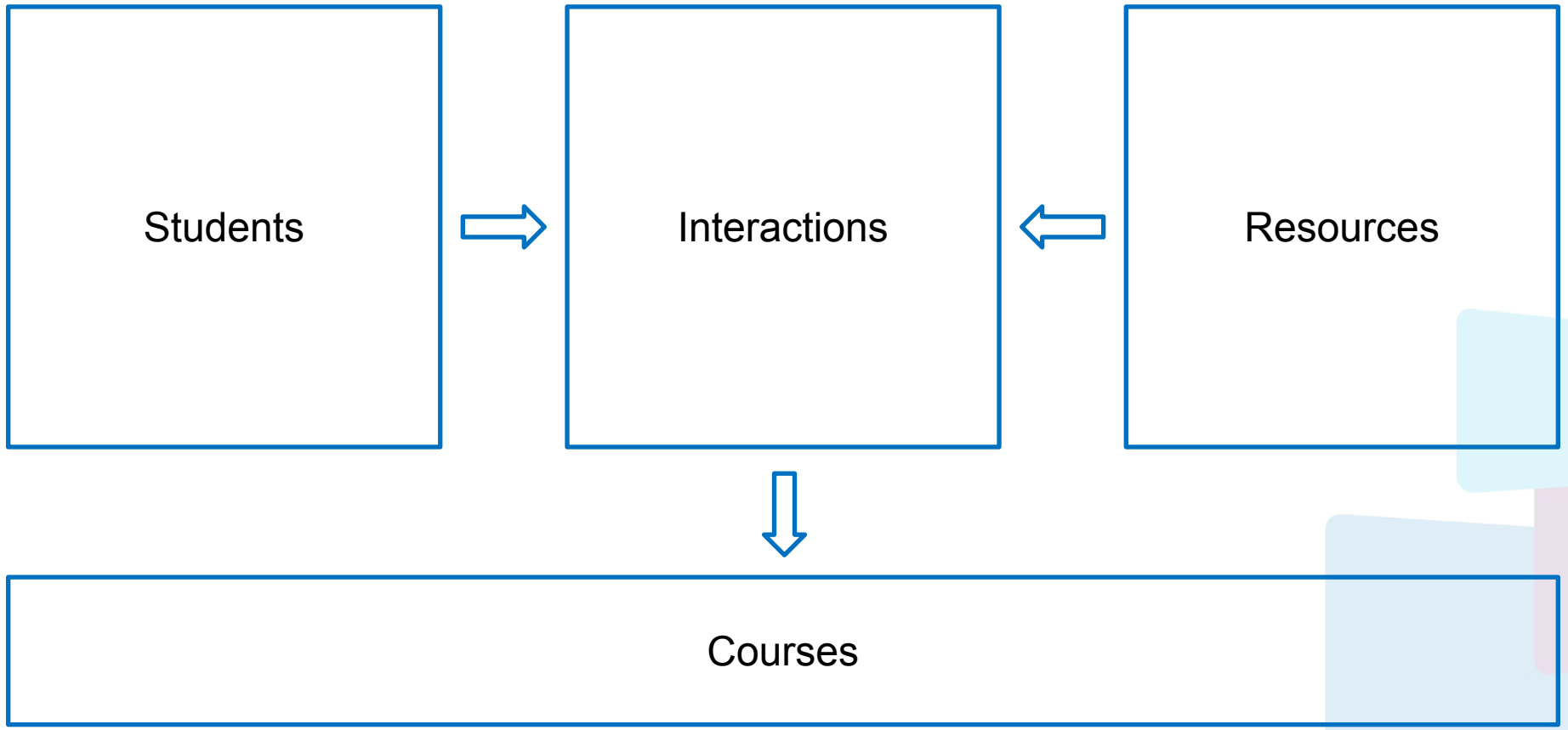
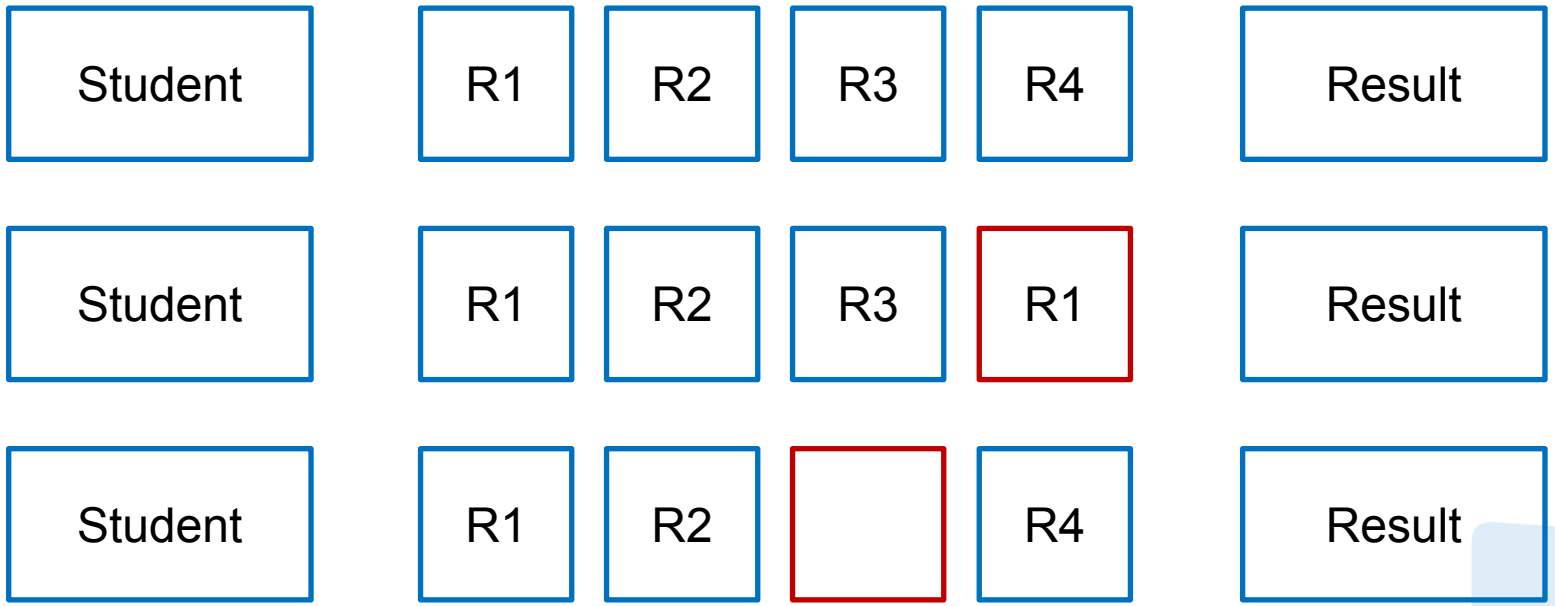
Measuring the effectiveness of different ML and DL models

Analyzing the generated interaction data at different stages

Open University Learning Analytics Dataset



Problem Definition



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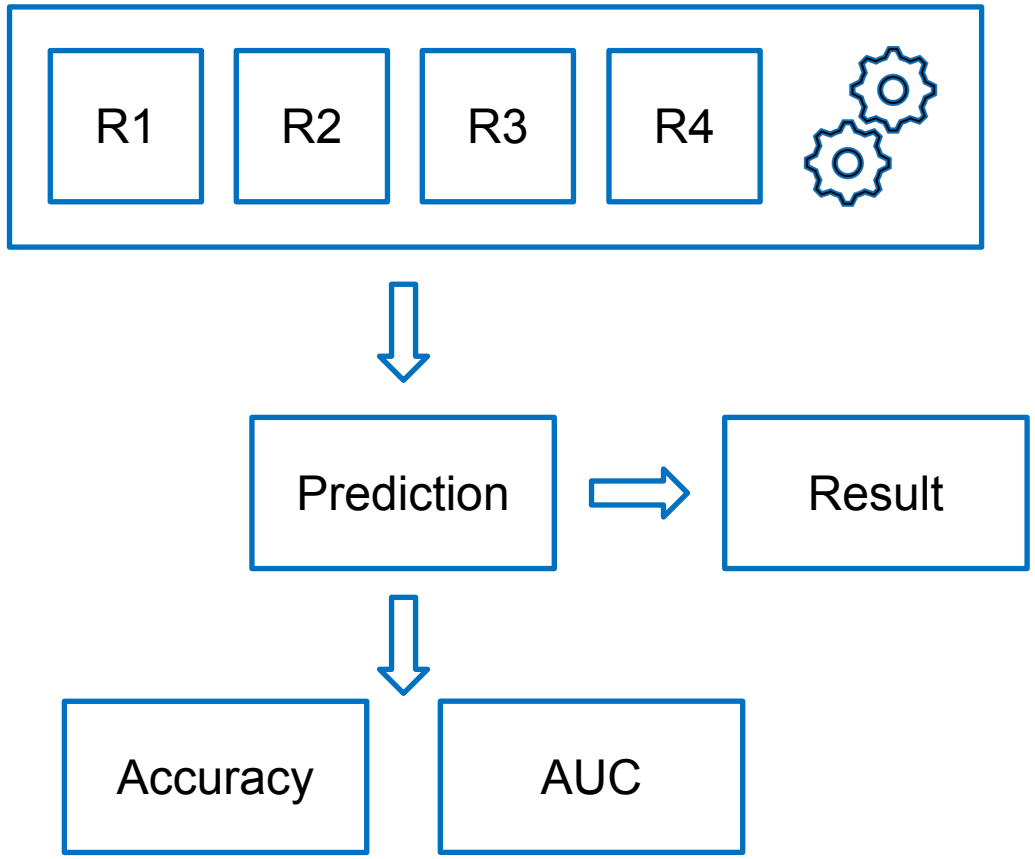


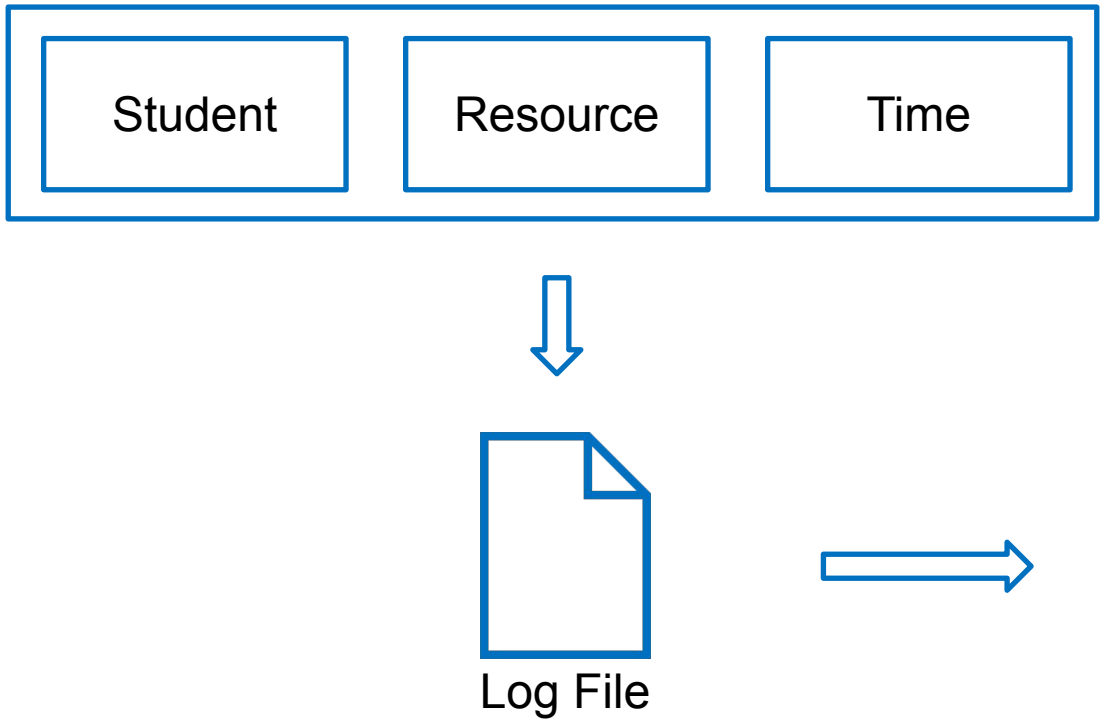
Pass

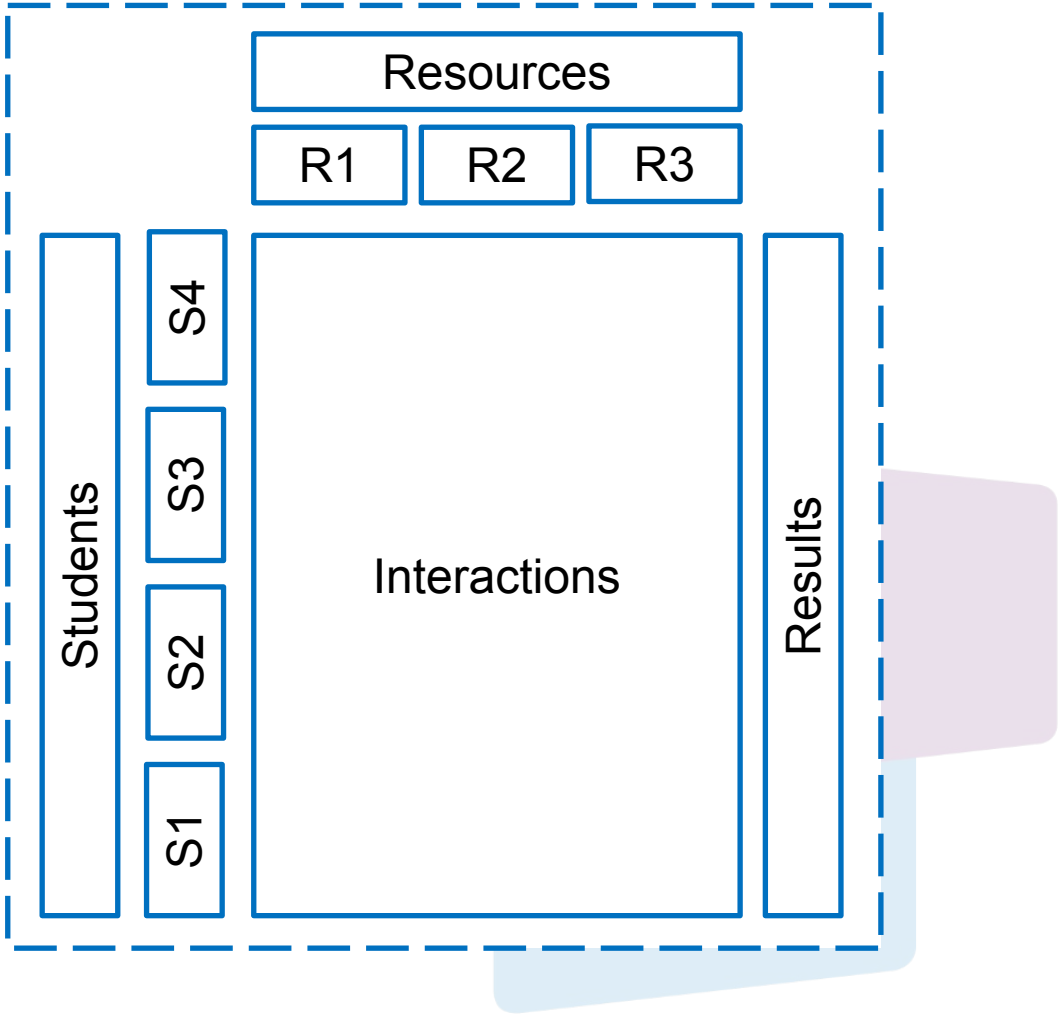
Distinction

Fail

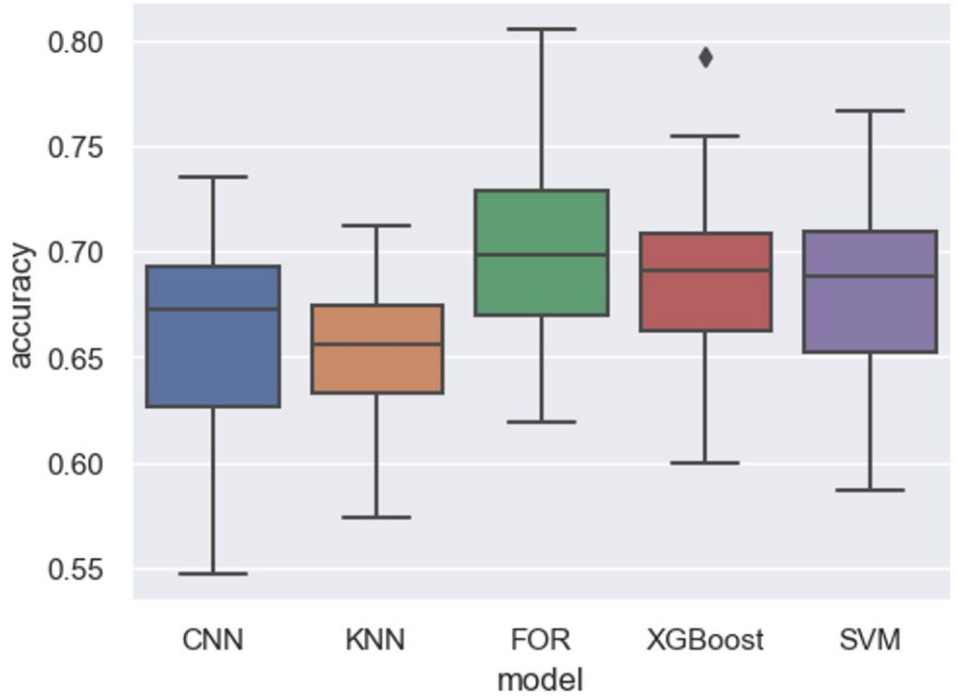
Dropout

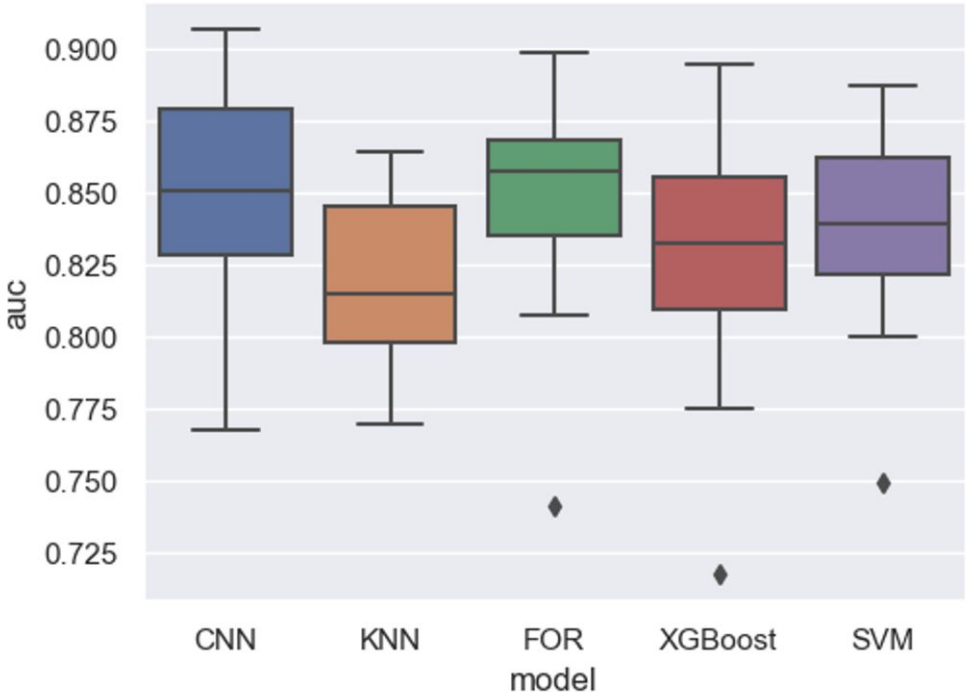
Data preparation





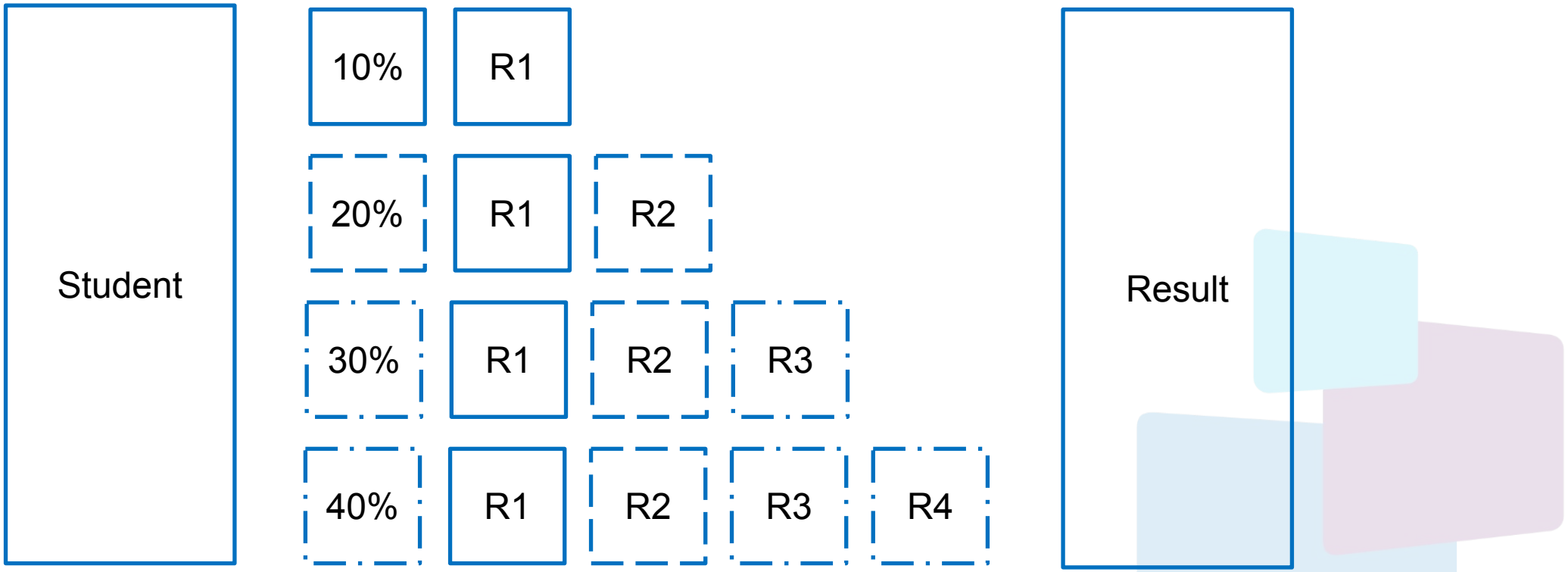
Obtained Results



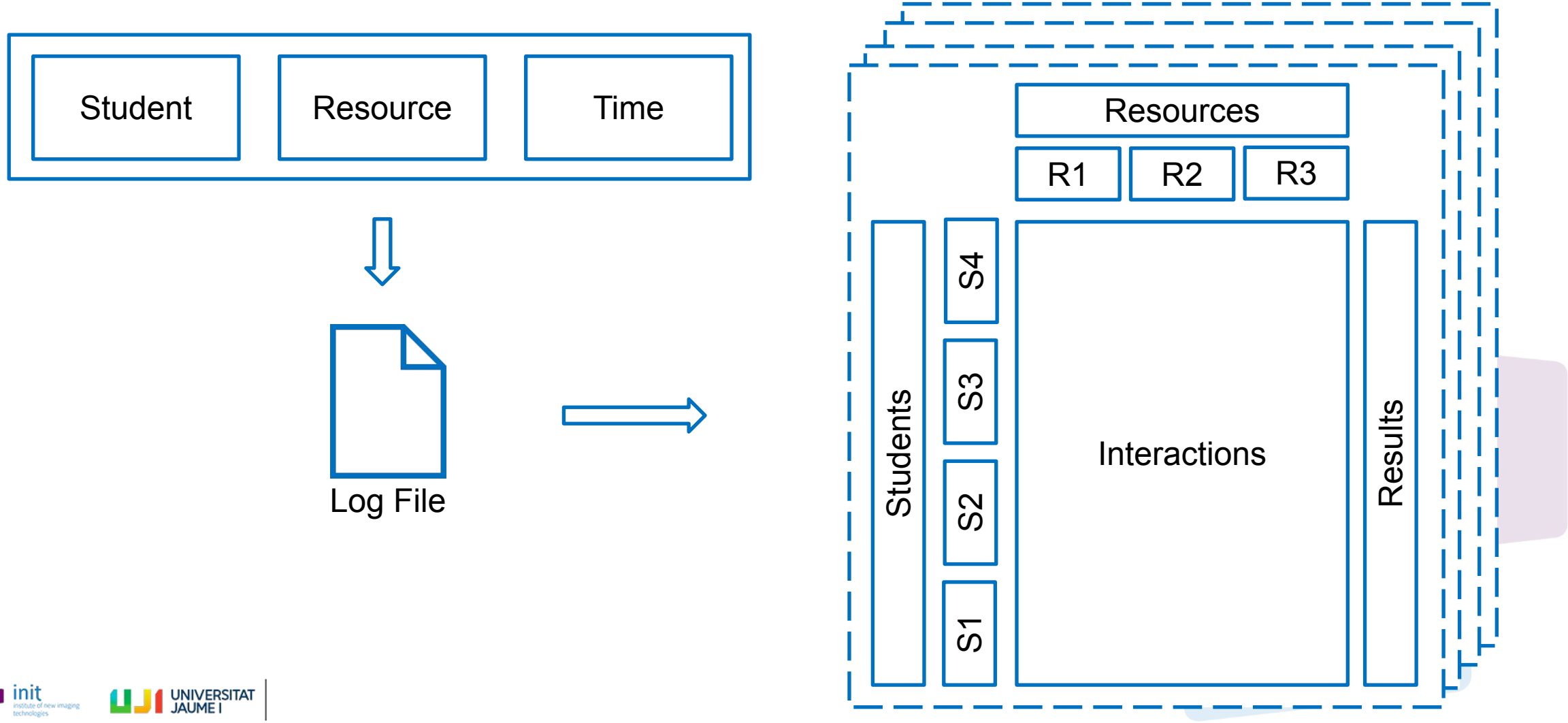


Presented at: 19th International Conference on Artificial Intelligence Applications & Innovations
DOI: https://doi.org/10.1007/978-3-031-34111-3_39

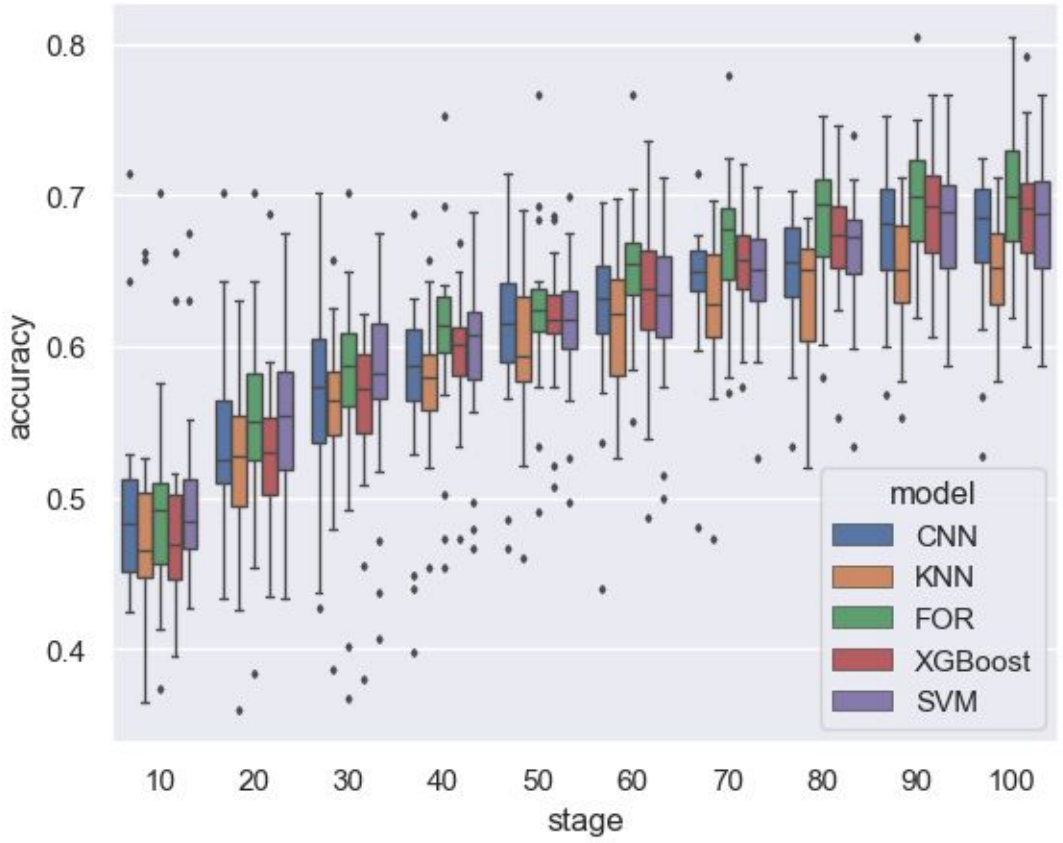
Problem Definition V2

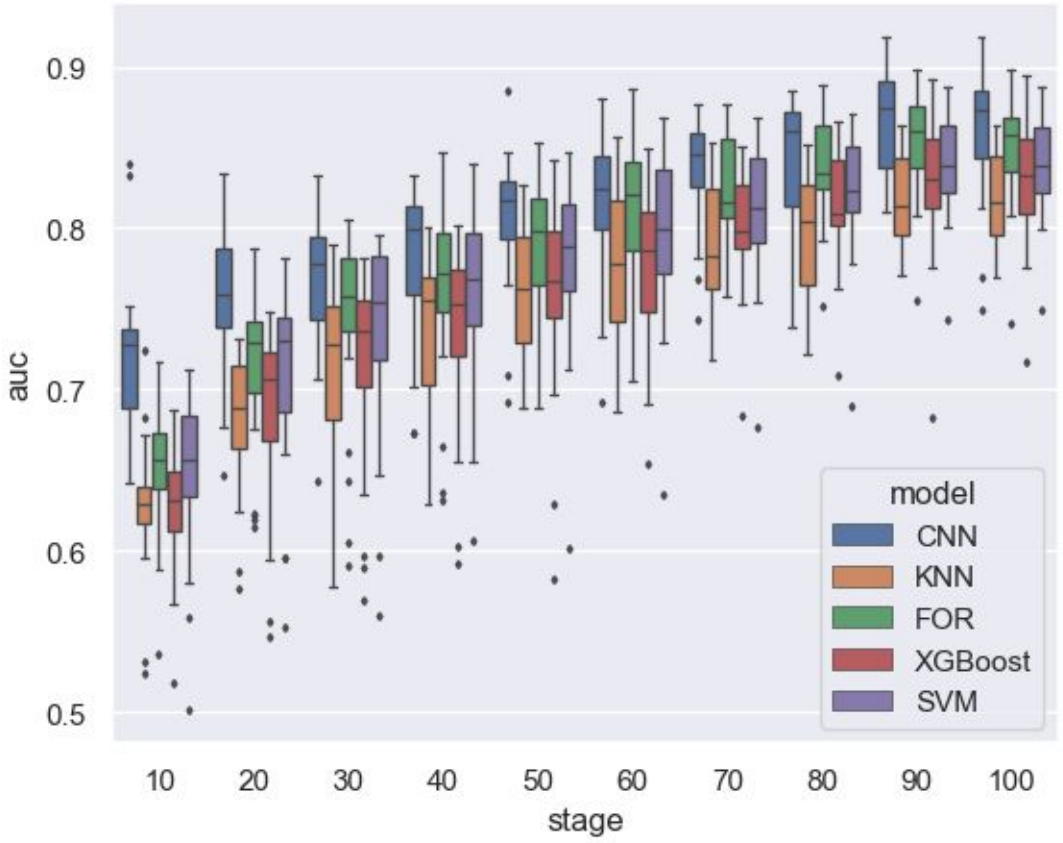


Data preparation V2



Obtained Results V2

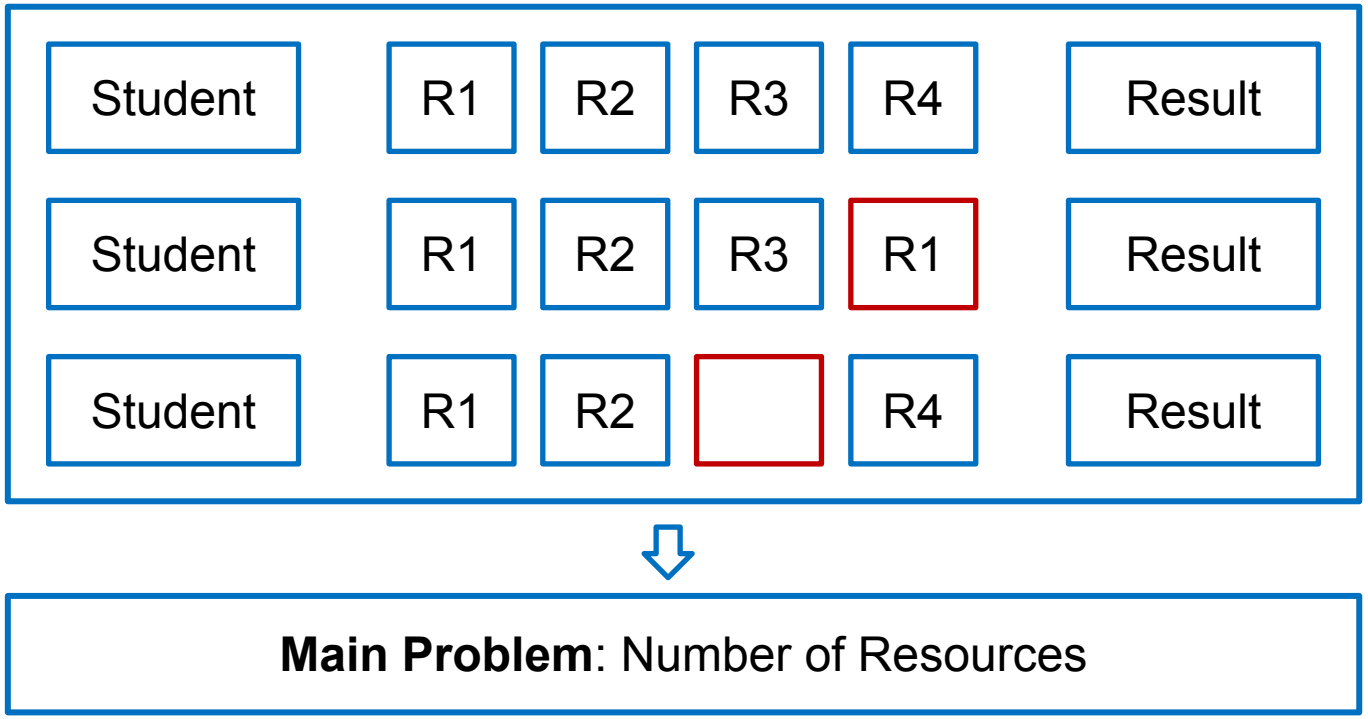




Presented at: 13th International Conference on Methodologies and Intelligent Systems for Technology Enhanced Learning
DOI: https://doi.org/10.1007/978-3-031-41226-4_23

04 Resource Analysis

Resources Structure



First Stage → μ = 172, σ = 93

Last stage → μ = 287, σ = 144

Resource Selection

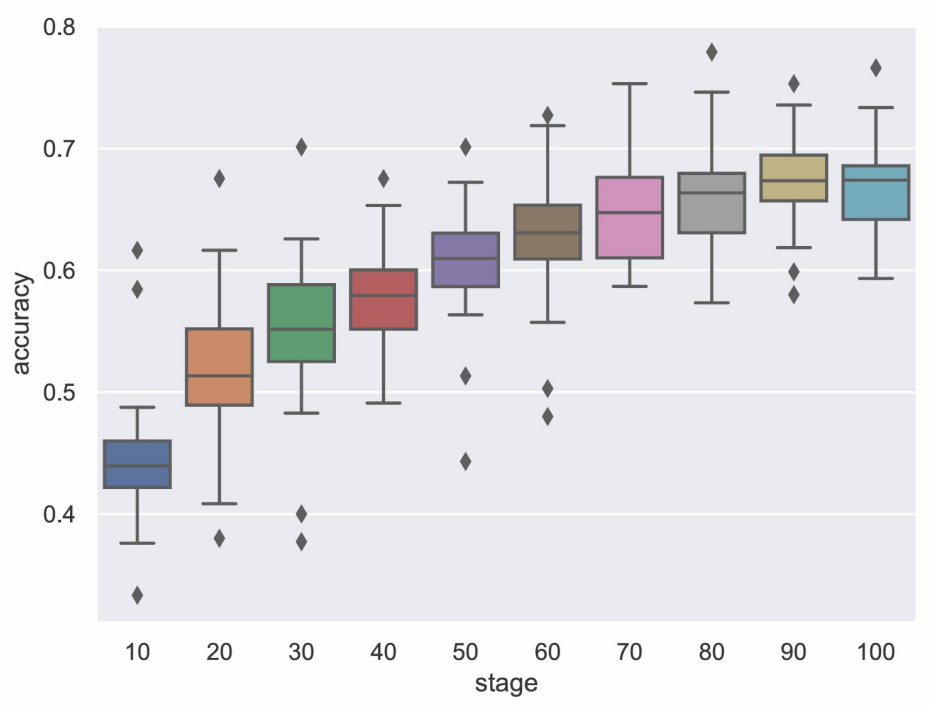
How can we extract the most significant resources?

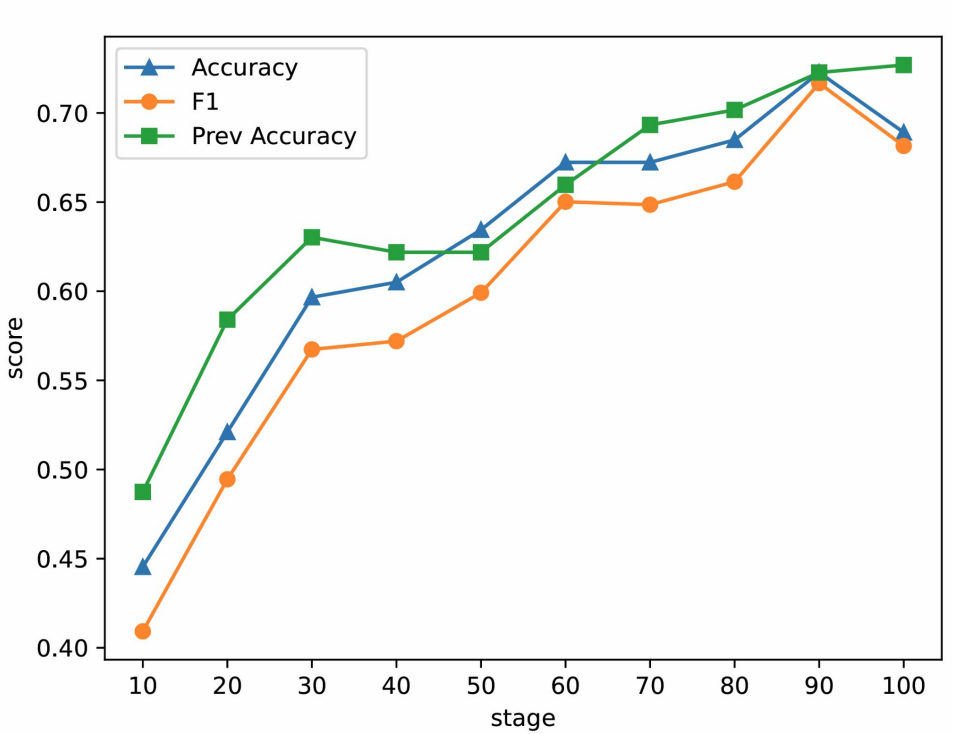
Feature Selection

Voting Selector	Genetic Selector
Combination of 5 of the most common classic feature selection techniques	Adapted Online Evolution genetic algorithm to select resources

Voting Results

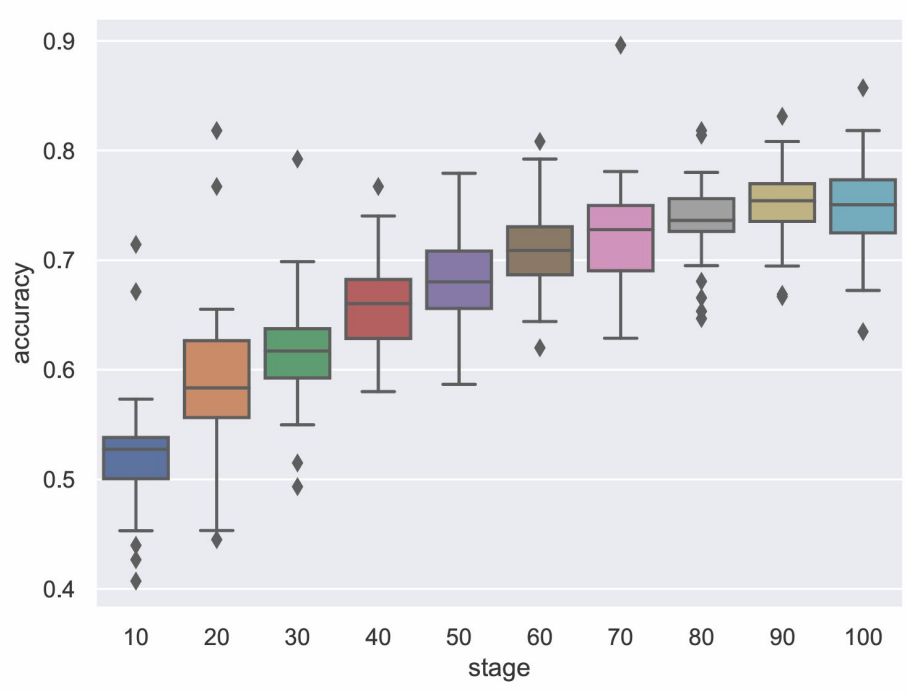
Voting Selector

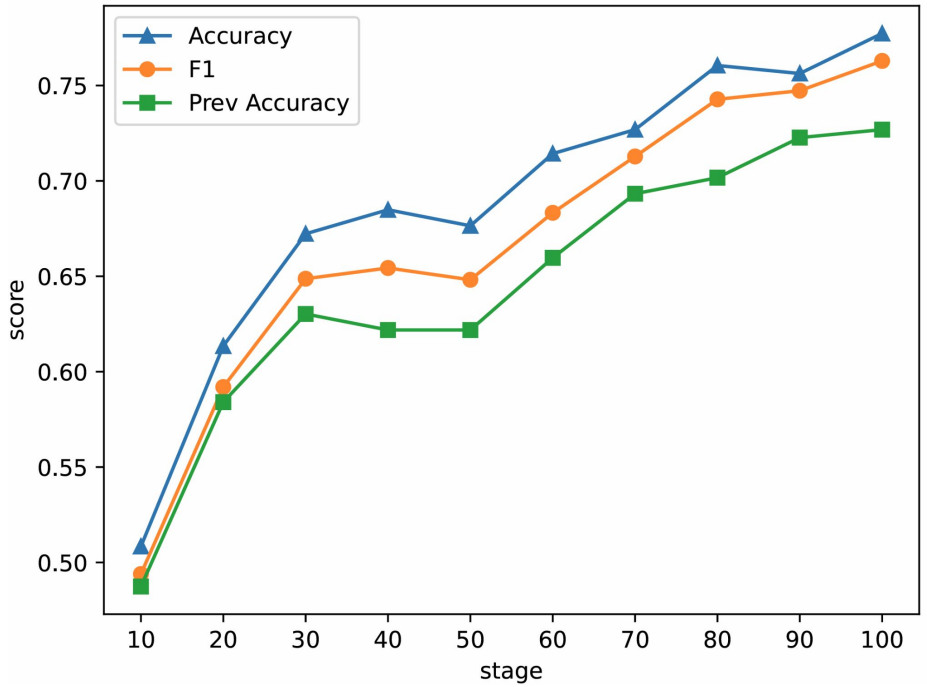




Genetic Results

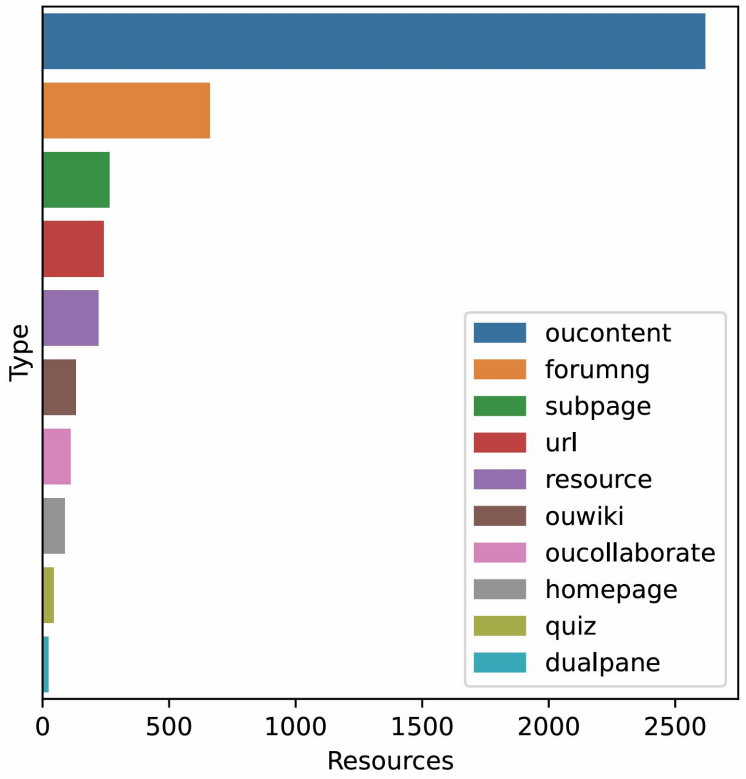
Genetic Selector



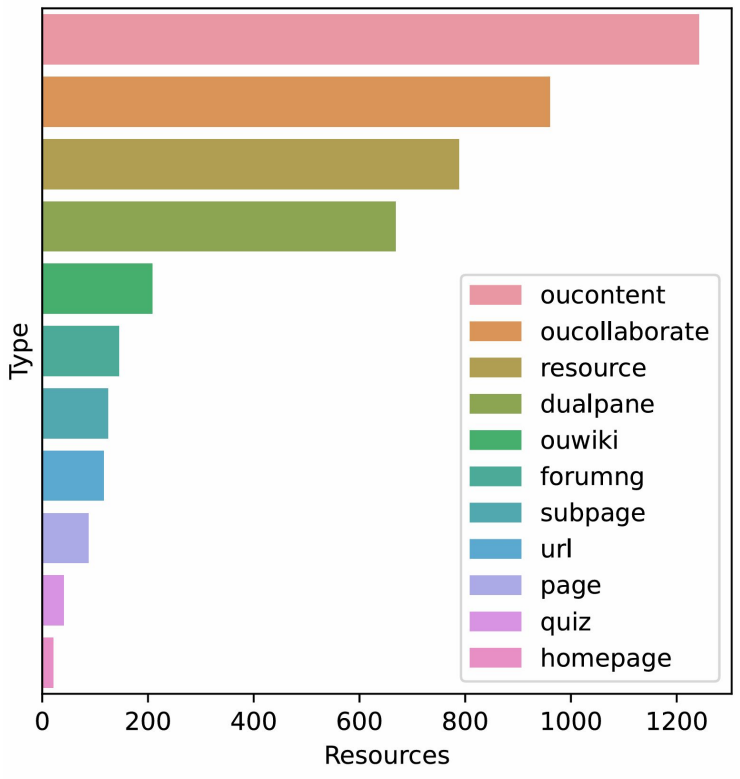


Selected Resources

Voting Selector



Genetic Selector



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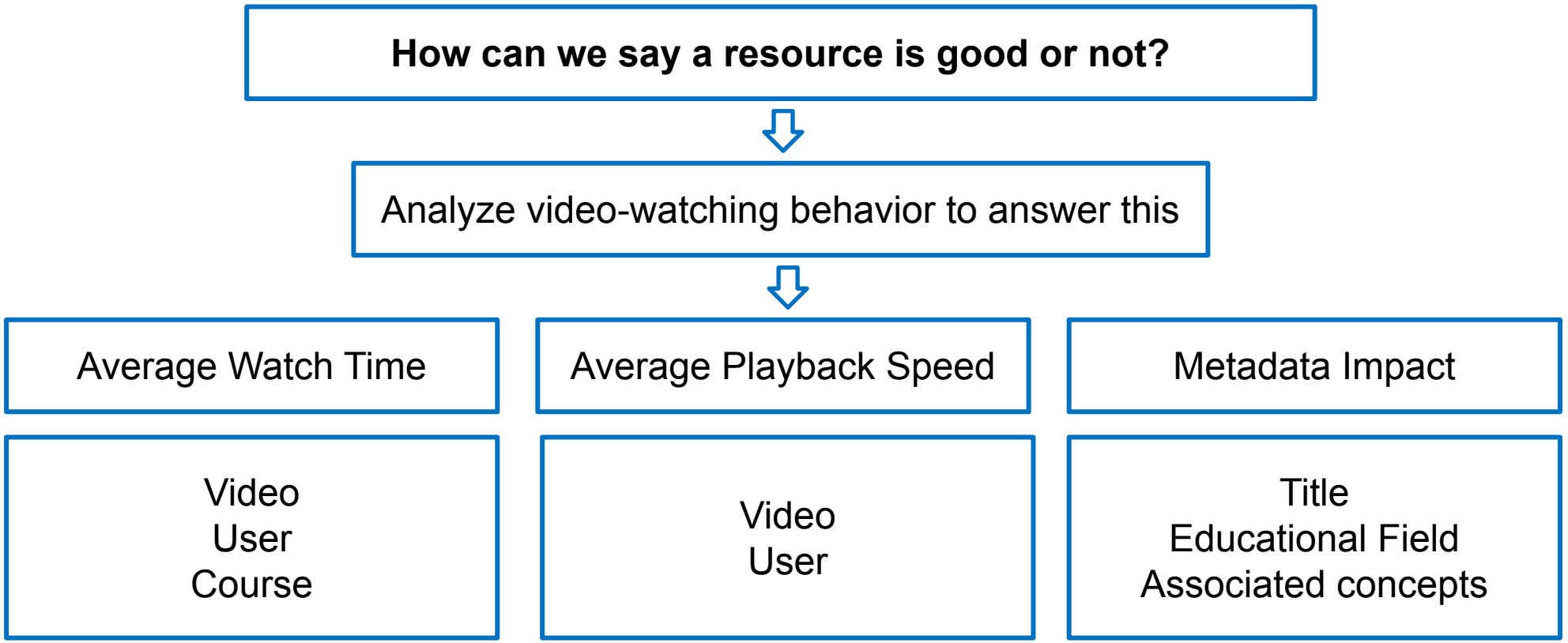
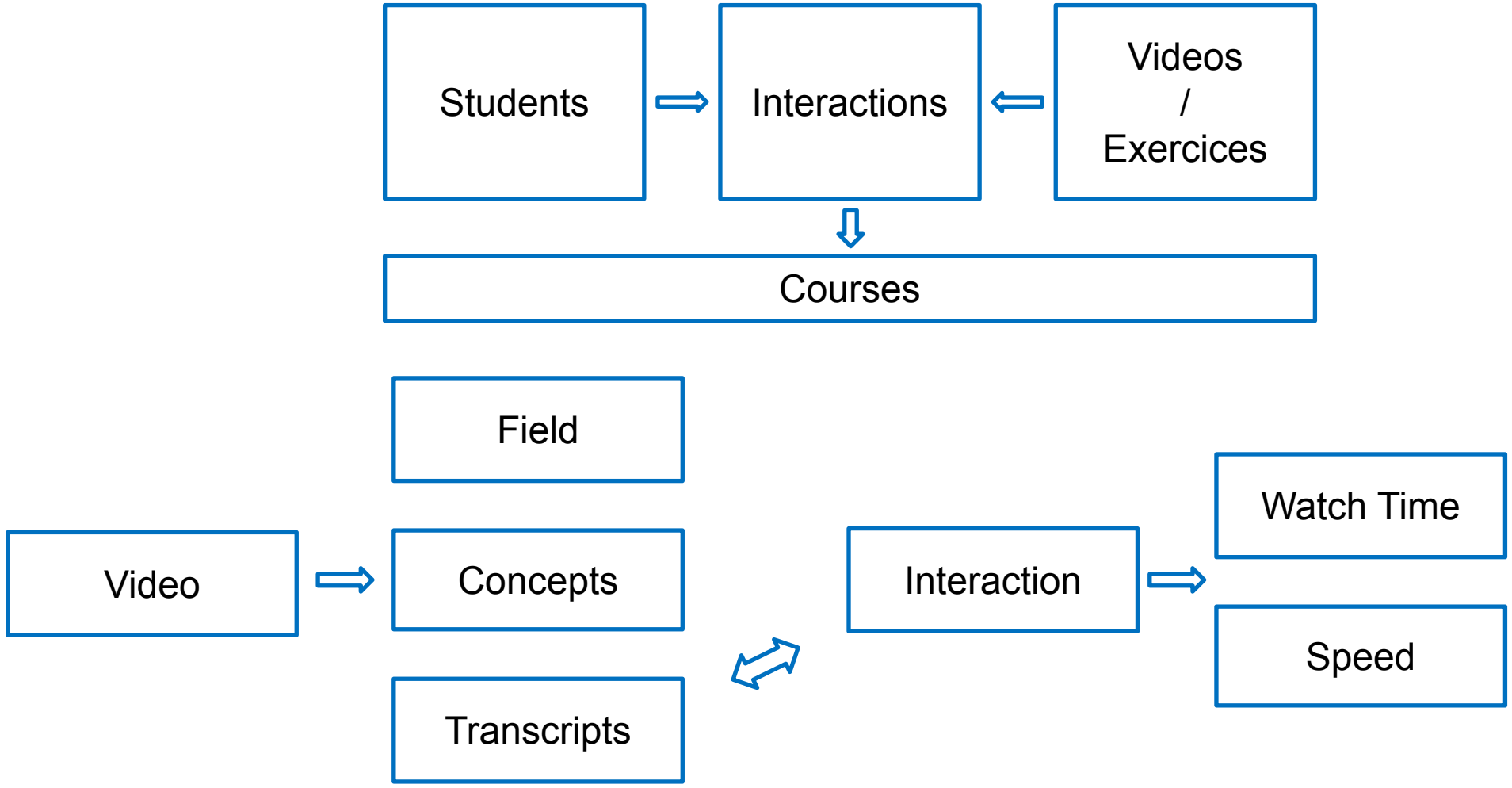
05 Video Analysis

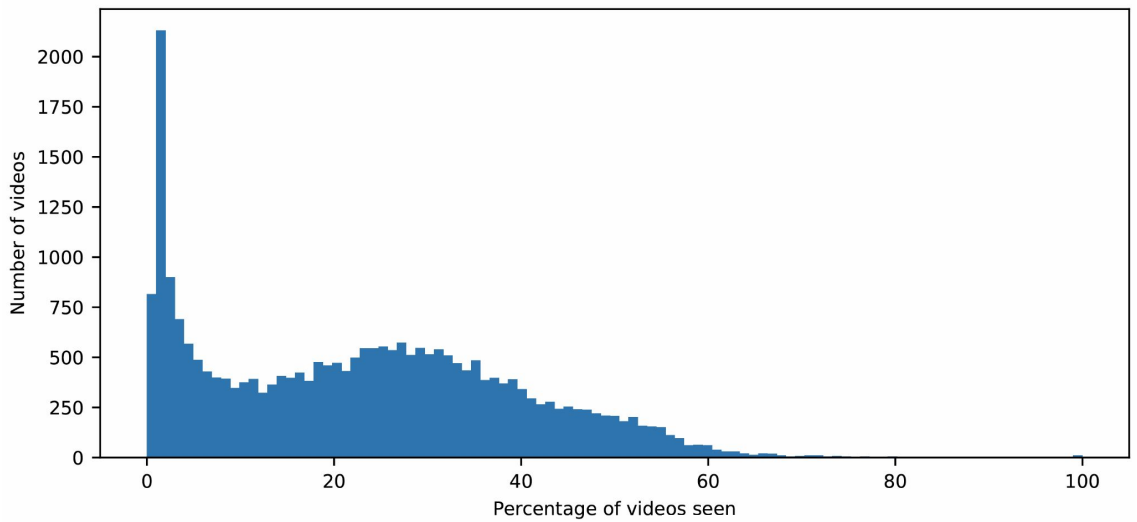
Resource Quality

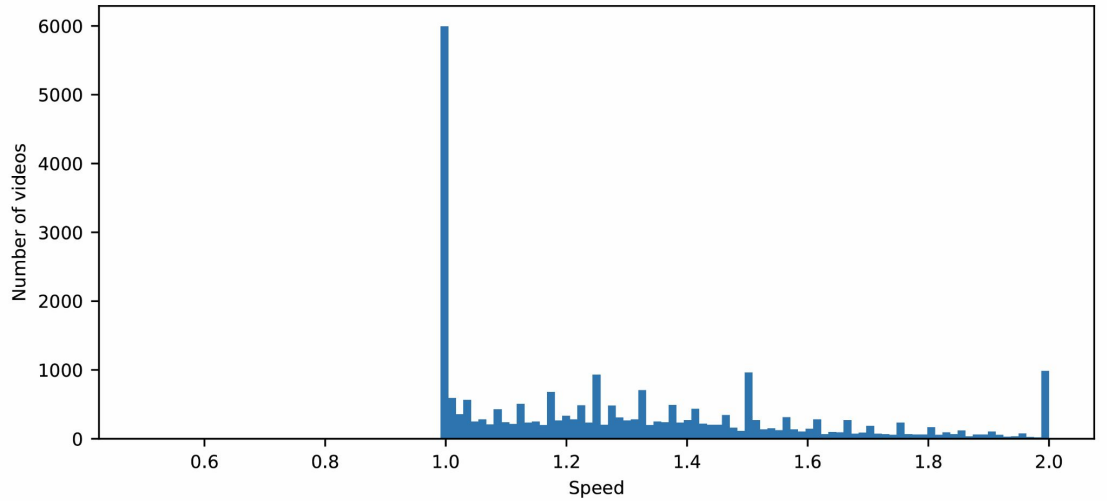


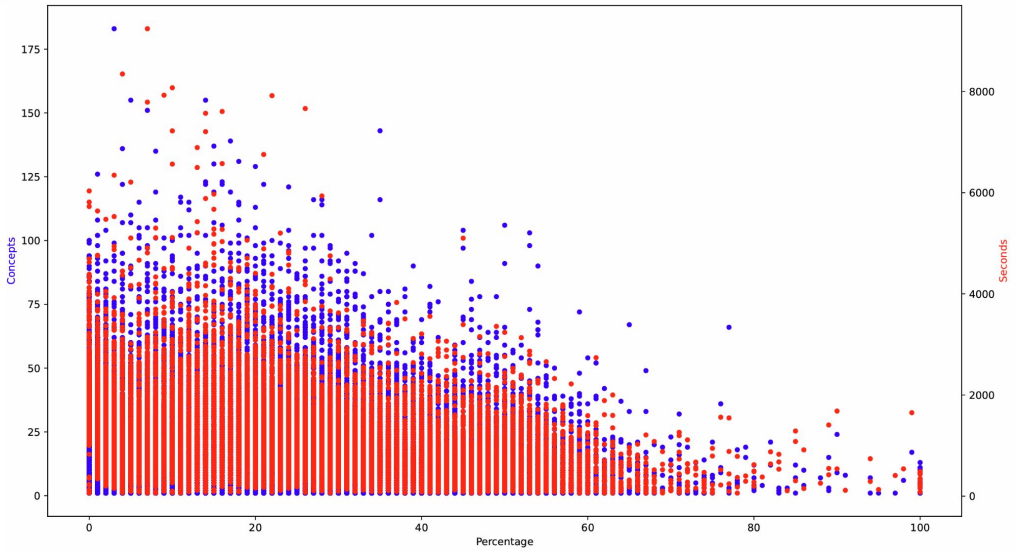
MOOCCubeX Dataset



Some Results

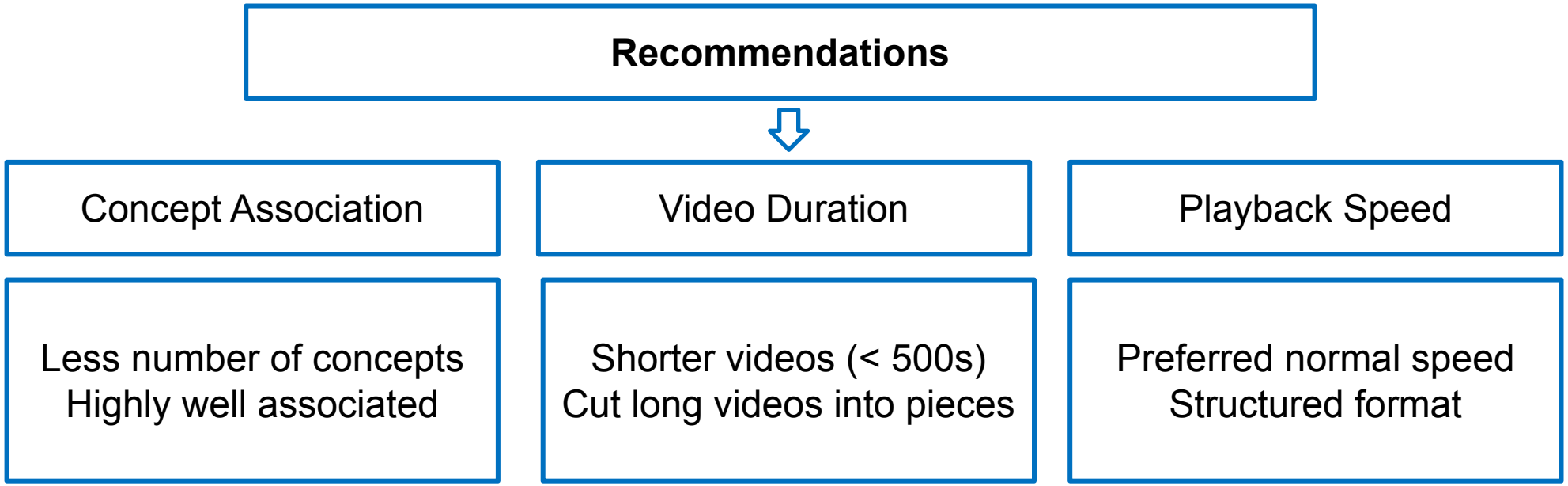






To properly see this image go to: https://almtav08.github.io/cubexplot/

Video Creation Recommendations



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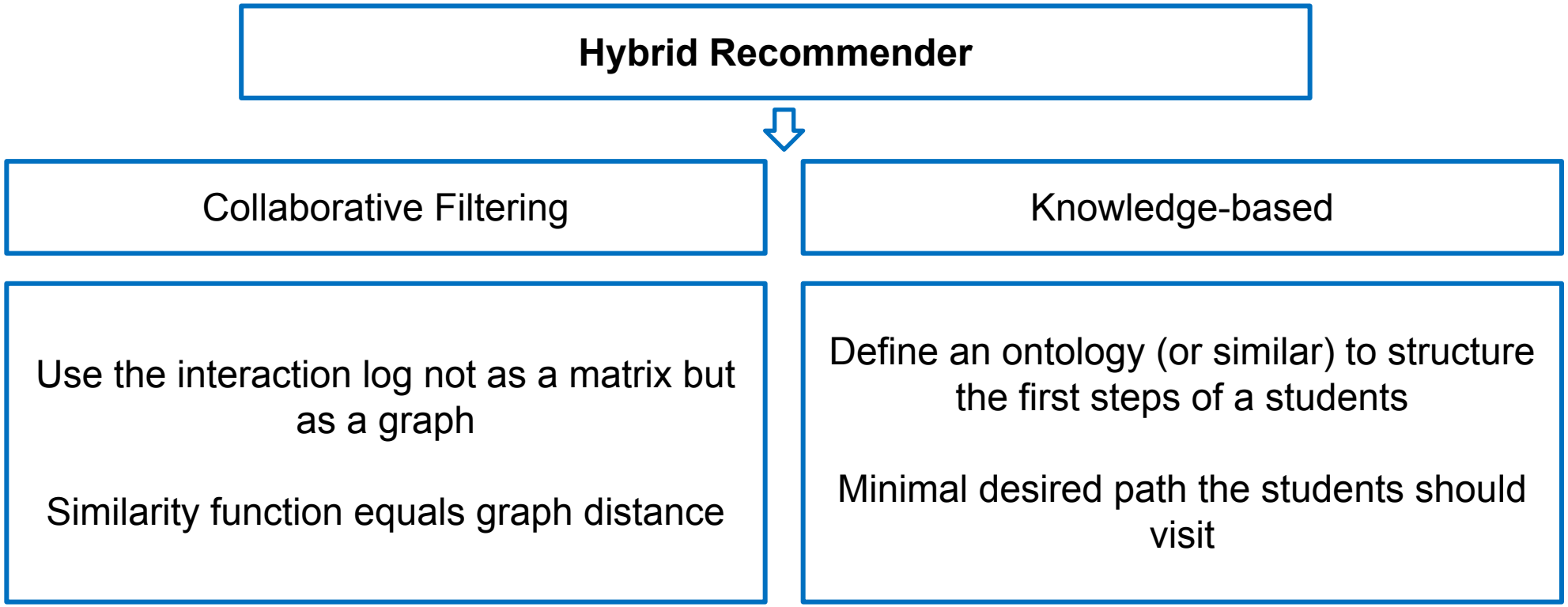
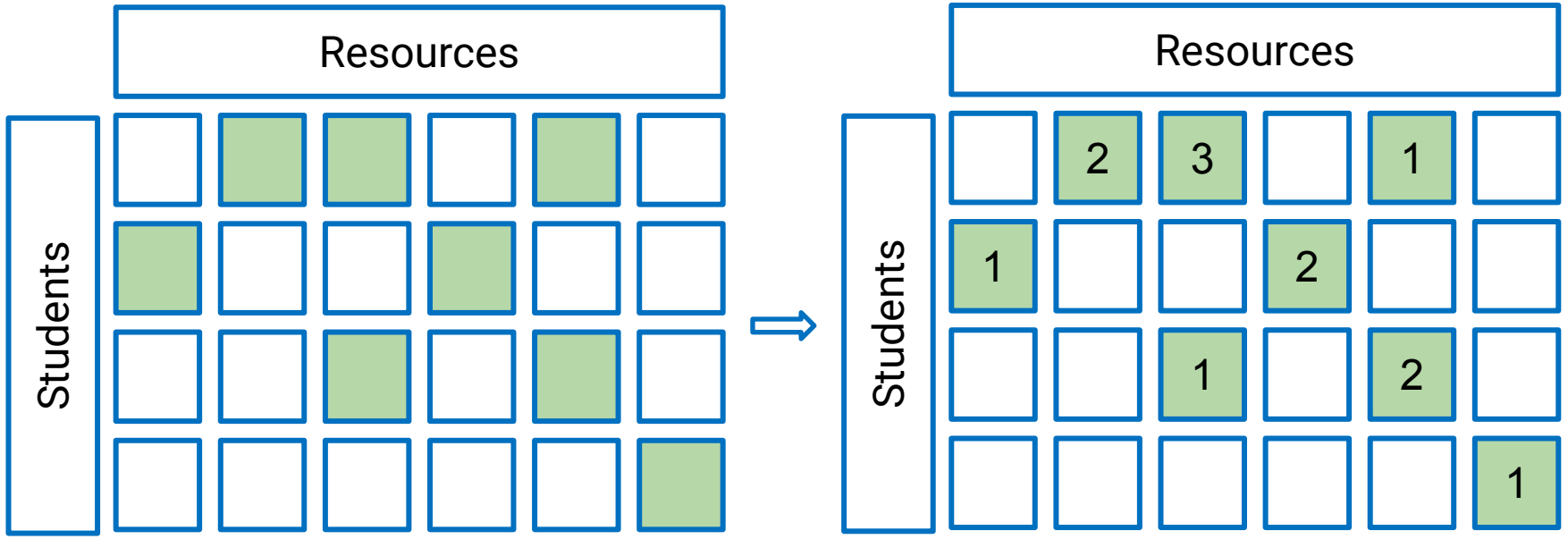
06 Recommender System

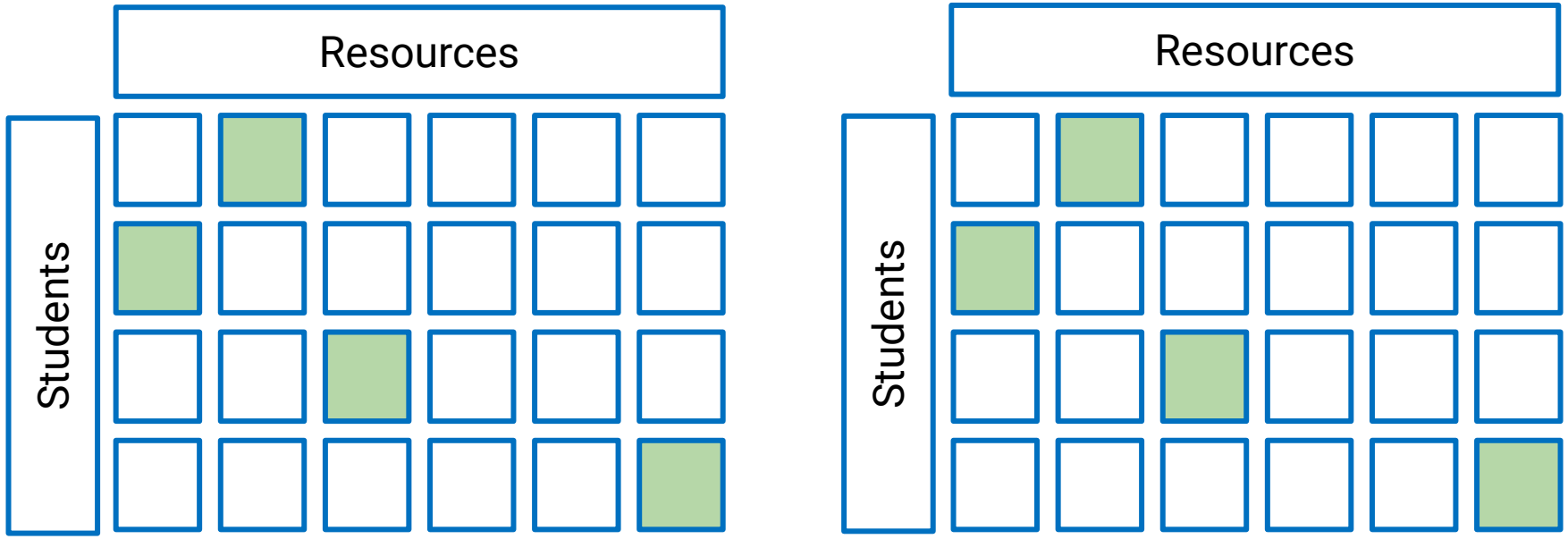
Recommender System Idea



Current Limitations I



Current Limitations II



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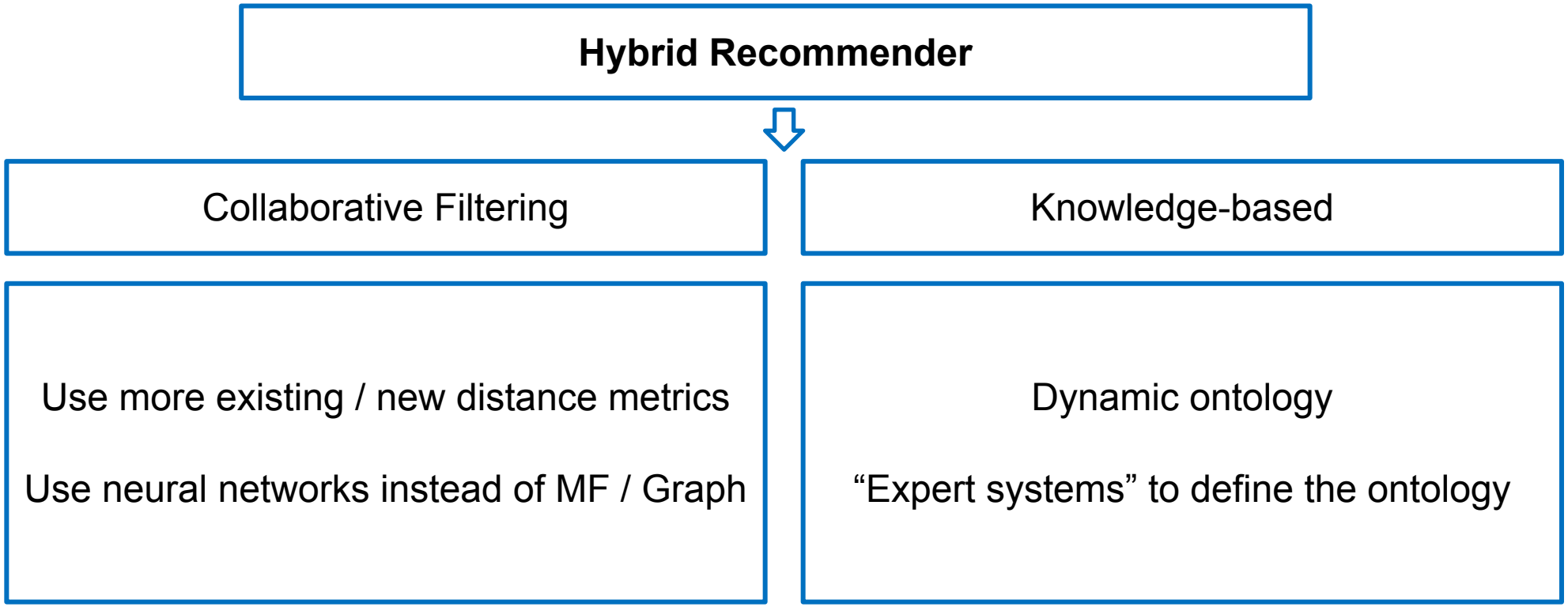
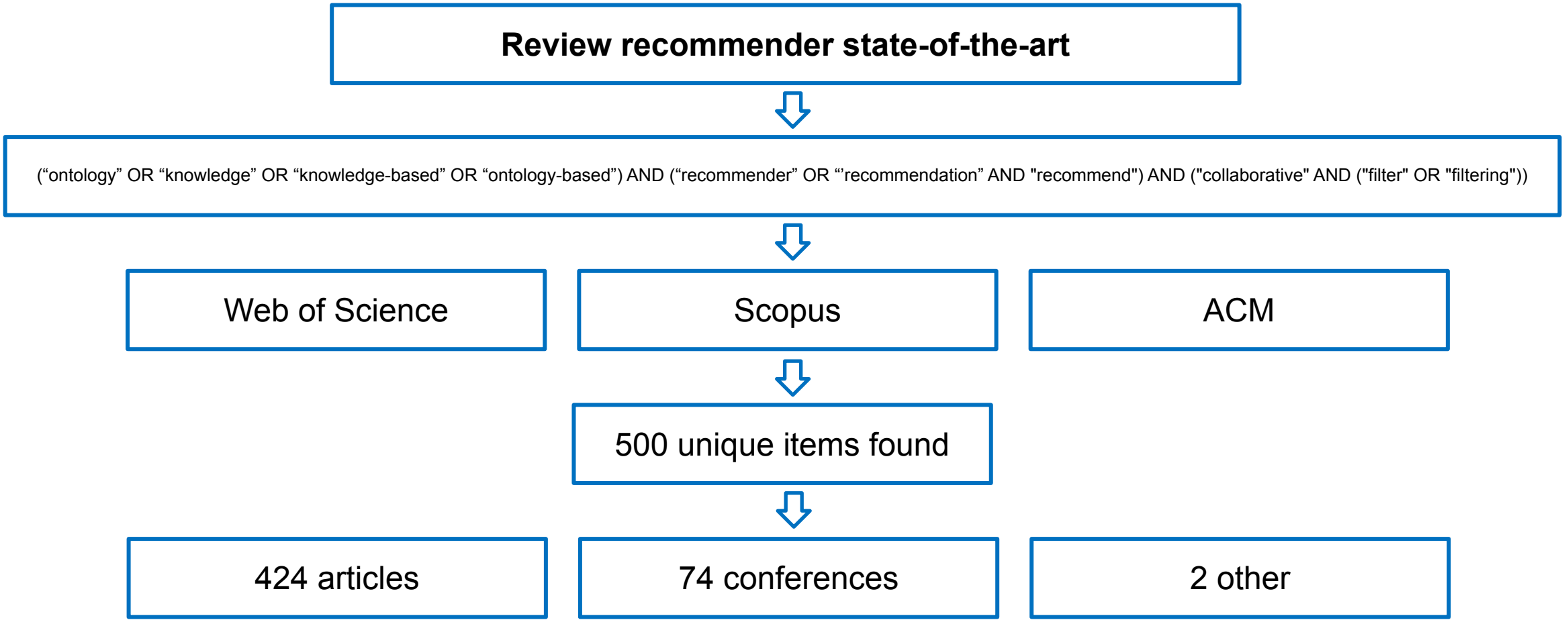
Ontology definition

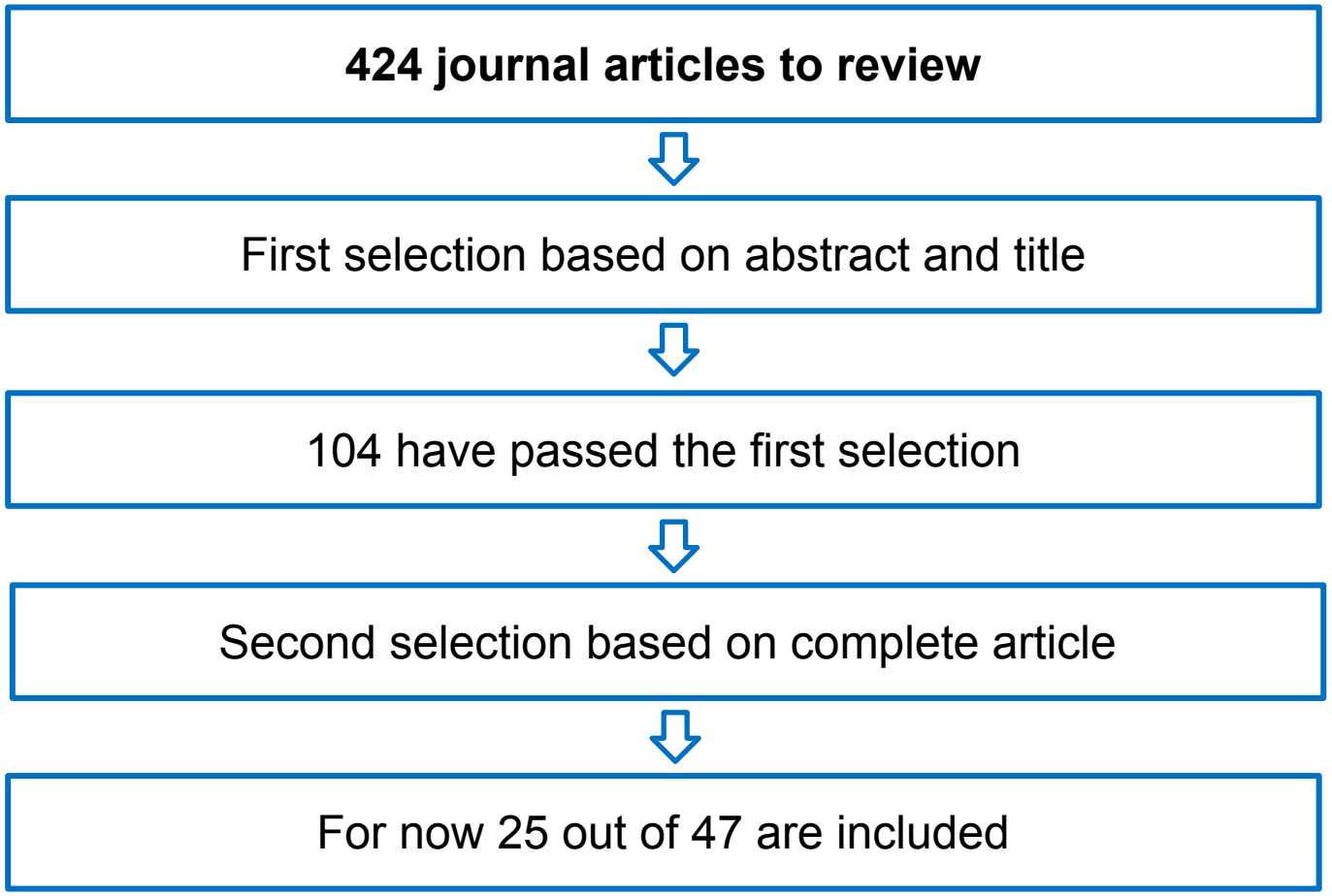
Recommender System Idea Improvements



Recommender System Review



Articles Review



THANK YOU

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