JACOBB

Centre d'intelligence artificielle appliquée

Earlier detection of at-risk students through artificial neural networks

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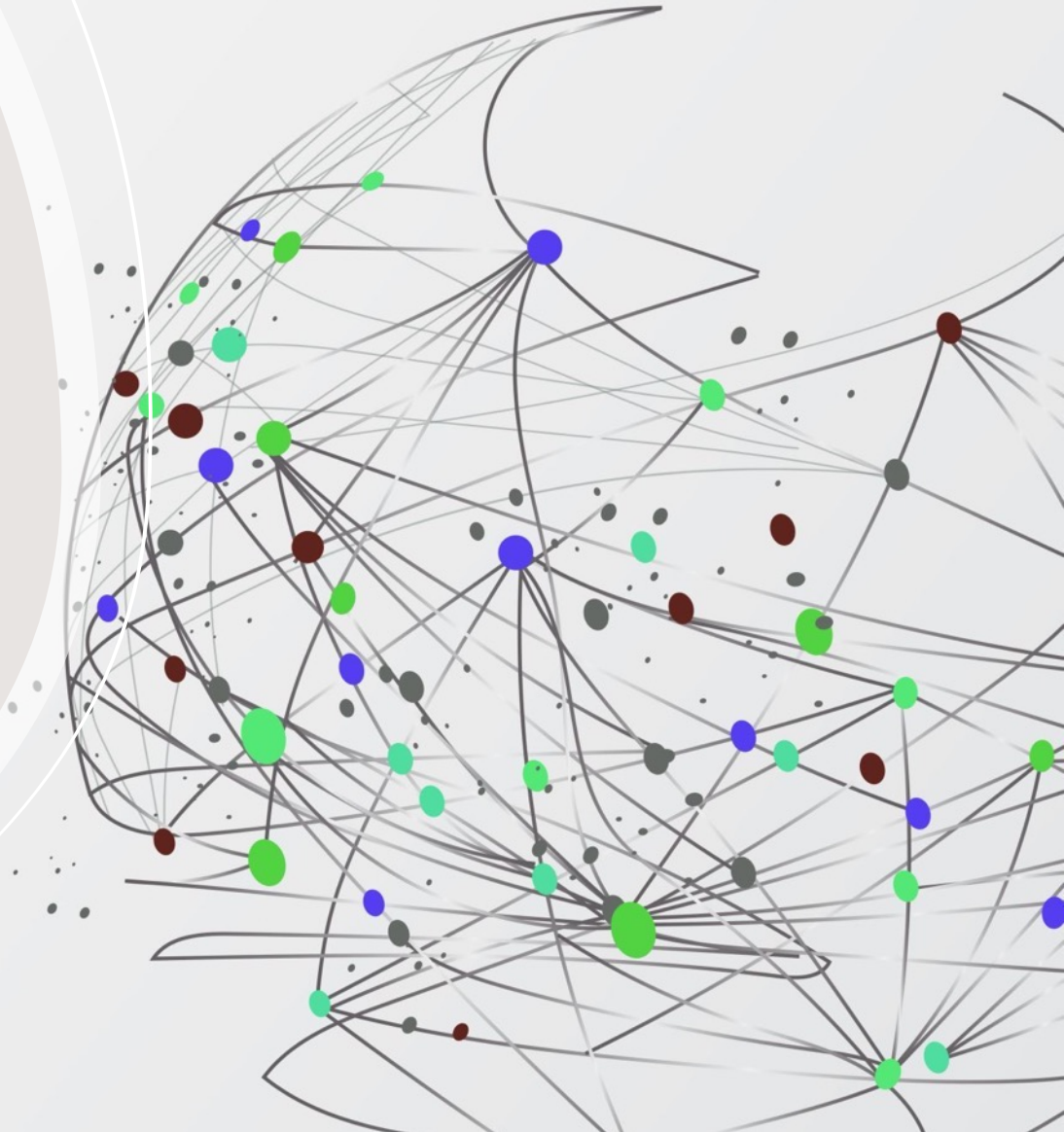


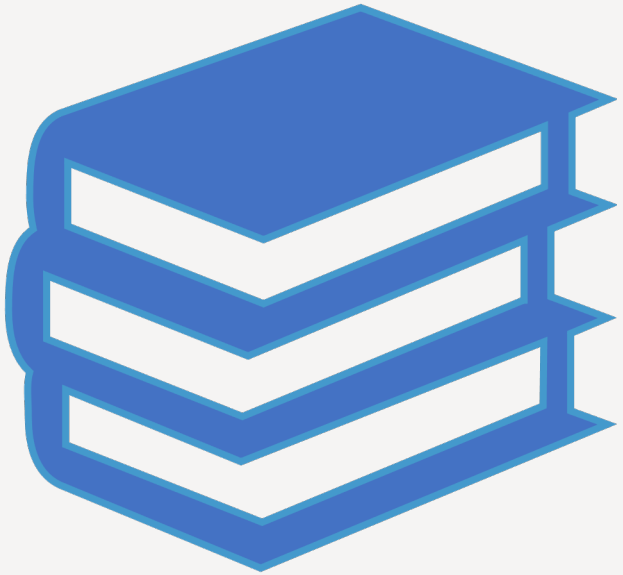
SALTISE 2021

Early alerting

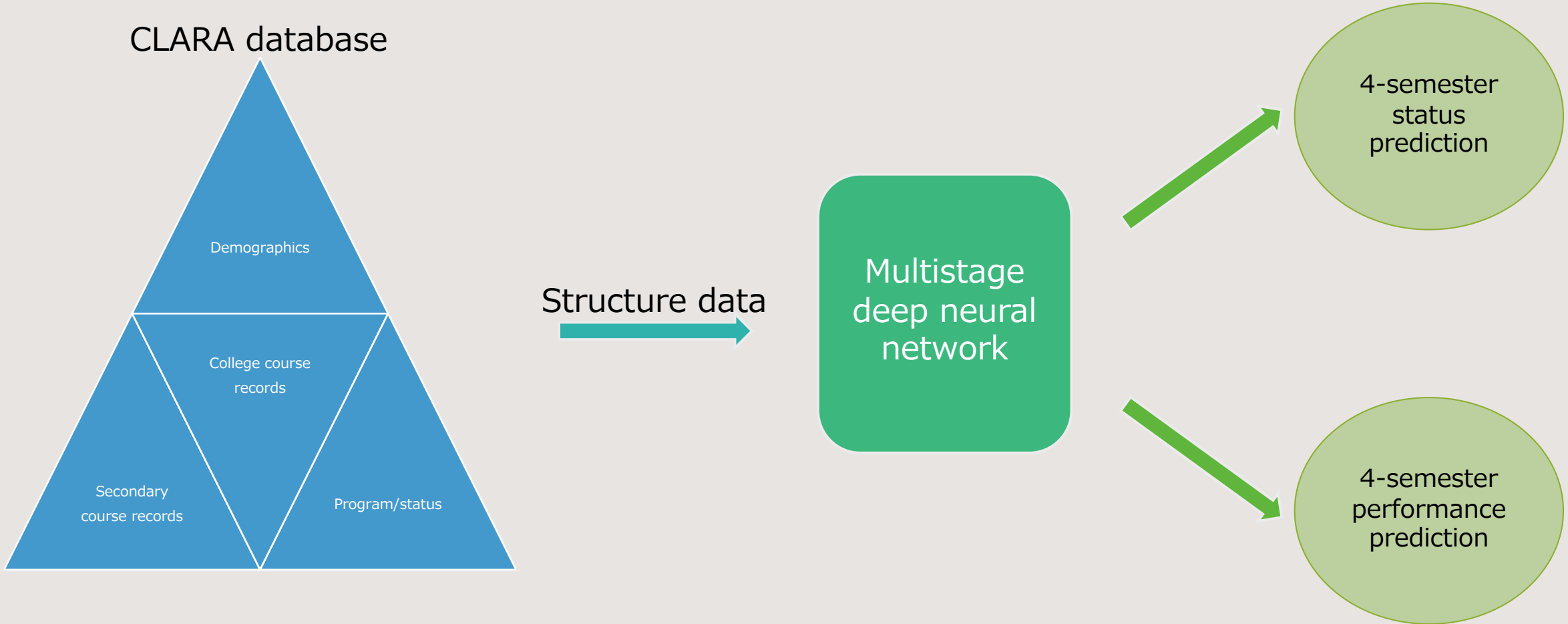
Supplements other academic progress monitoring (e.g., mid-semester assessment)

Goal: better target limited college resources.

- Which students are most in need of support?
- Which students could best benefit from support?



Interpreting college records



Model training

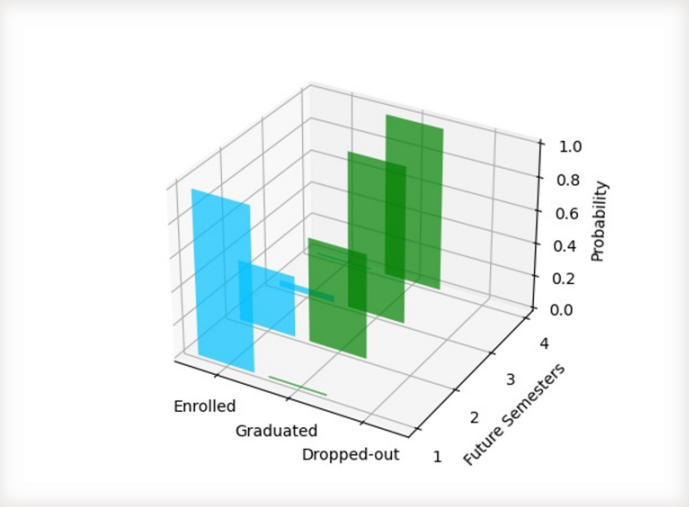
10 years of anonymized student records (~25k students)

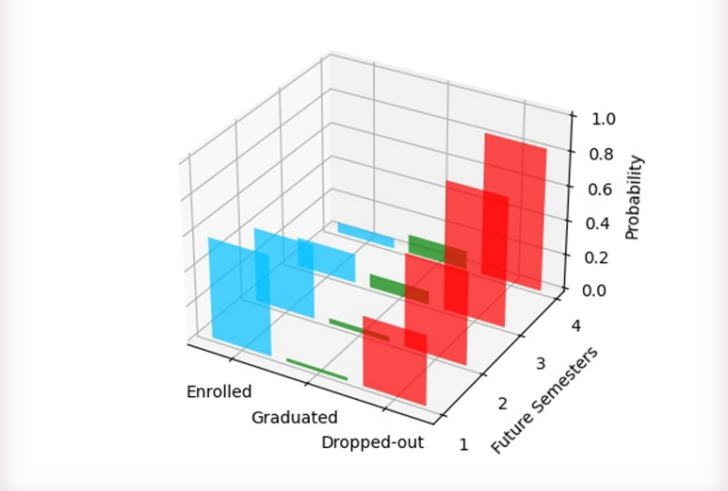
- Currently only one College
- Soon to diversify training data
- Hopeful to obtain province-wide data
- Model trained to make joint classification of student status (graduated, enrolled, dropped-out) and academic performance (fraction of courses passed)

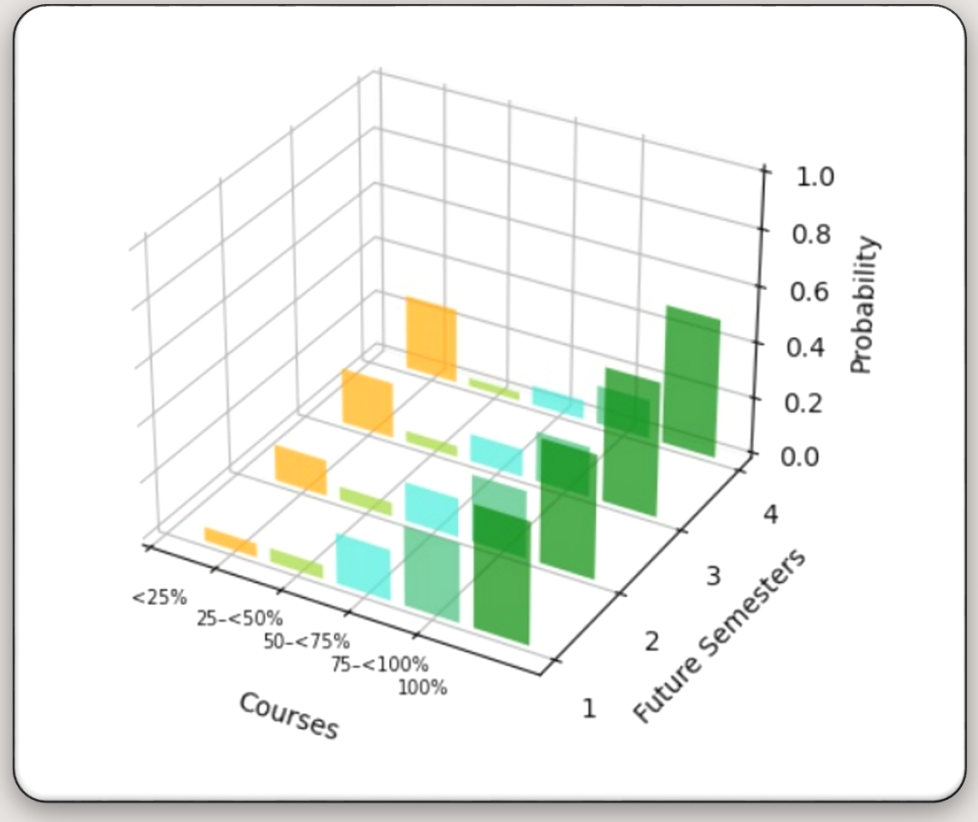
Early warning of drop-out

4-semester look-ahead

Single-student prediction





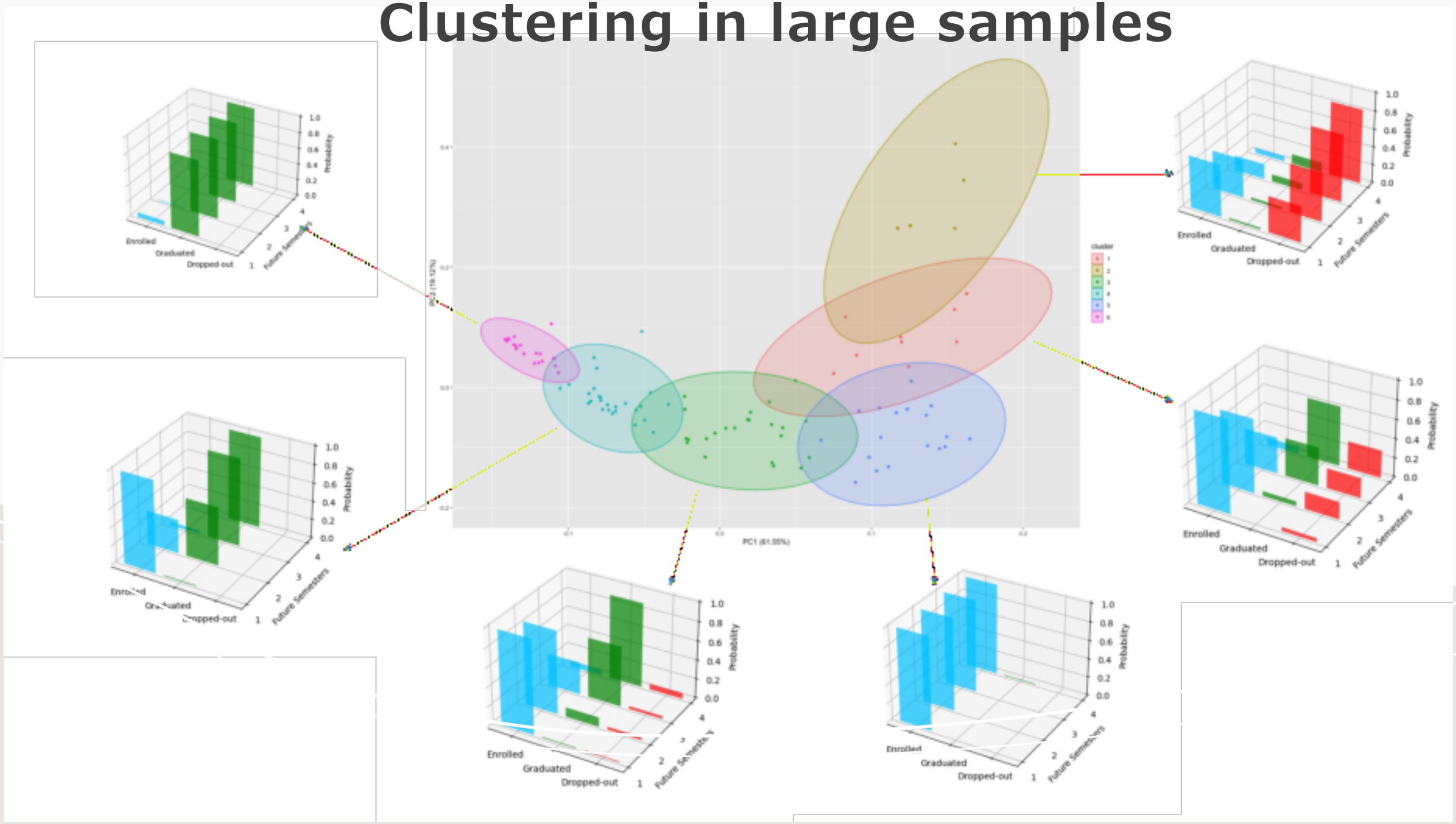


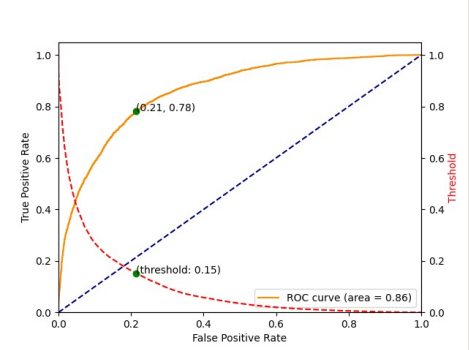
Early warning of academic difficulties

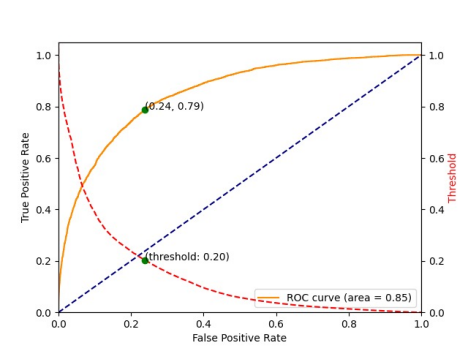
4-semester look-ahead

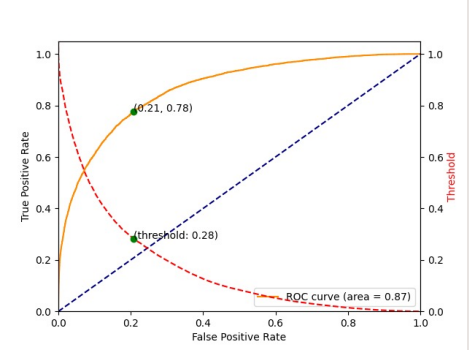
Single-student prediction

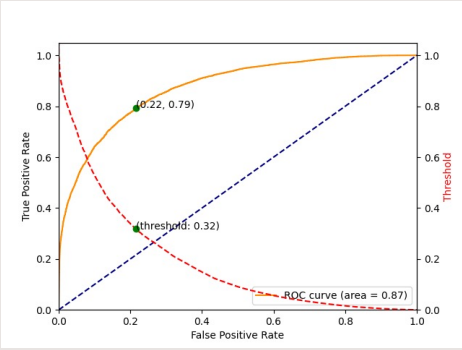
Clustering in large samples











Model performance on sequestered test data

Classification accuracy: > 70%

- *200%–350% better than random accuracy*

Sensitivity/Specificity

- *Area under ROC curve: > 0.83–0.89*

Addressing privacy, security, and ethical concerns

Only used for early alerting

- *Not suitable for College admissions*
- *Only users that have access to student records (e.g., Academic Advisors) can use*

Student identities are never used

- *Training: pseudo-identities are used to assemble records, and then discarded*
- *Inference: student records are assembled client-side, no identities are transmitted*

Data are encoded before secure transmission

- *Heavy use of embedding maps to encode variables*
- *Secure transmission of coded records to generate inference.*

Under development

Detection of changing trajectories

- *Flag sudden change in student situation prompting intervention*
- *Sudden improvement can be noted to identify effective interventions*

Realtime alerting (using Léa gradebook)

- *Modelling typical course trajectories within the semester*
- *Course records-based history vector provides individualized context*

Inclusion of interventions

- *Tracking interventions taken with individual students*
- *Future: suggesting of interventions likely to be effective*