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Towards cluster based adaptive learning

Towards Cluster-Based Adaptive Learning

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Problem Statement

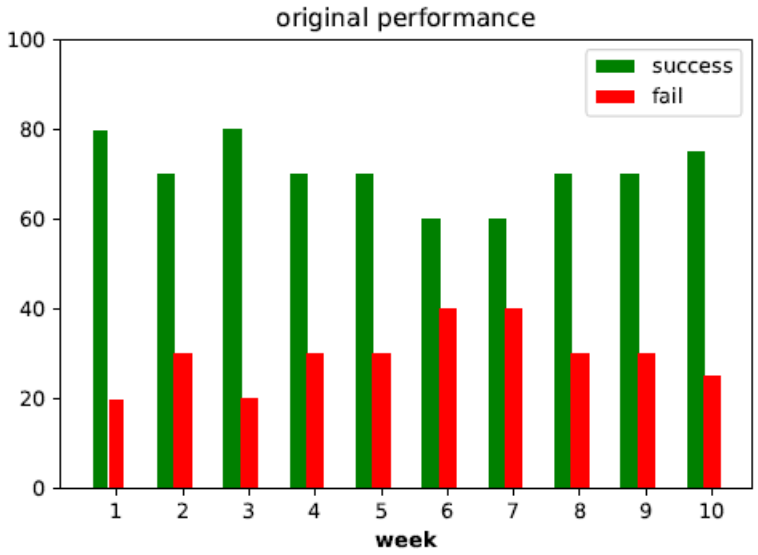
- set-up: large classes (possibly on-line)

Question 1: How to (“easily”) describe student performance?

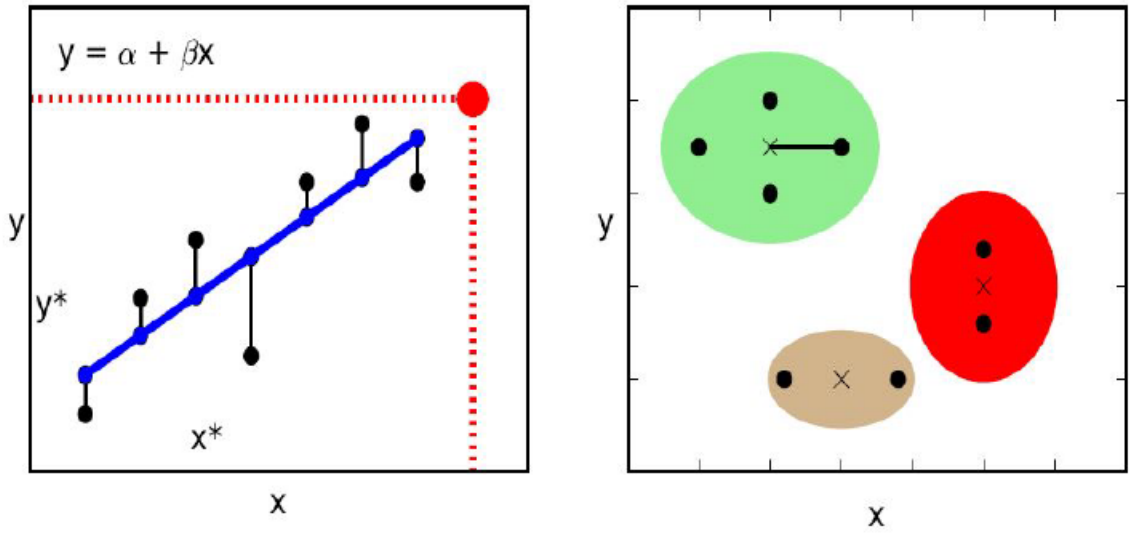
Question 2: How to adapt course instruction?

- solution: combine machine learning and visualization

Original Student Performance

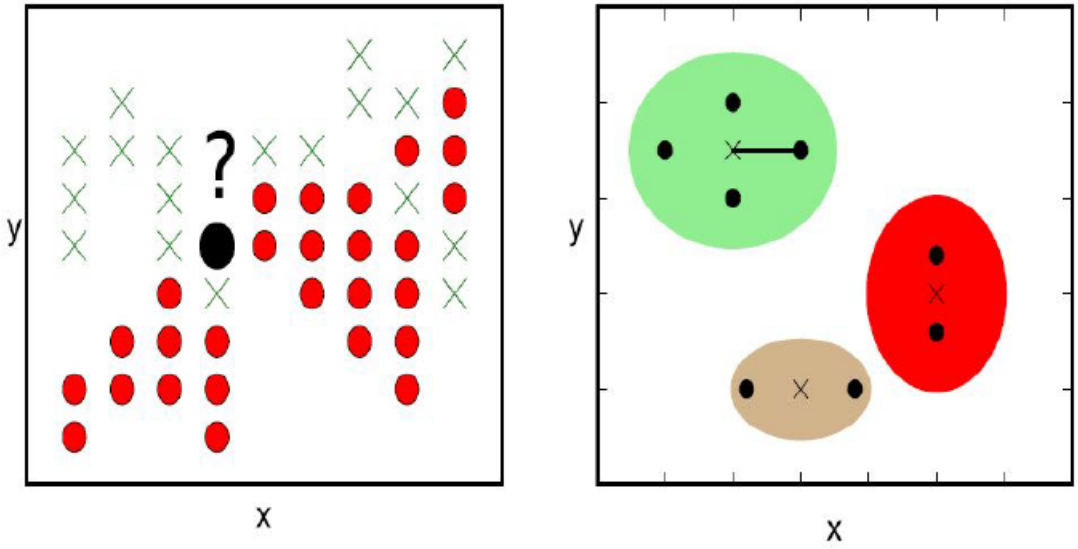


(Almost) Everything You Need To Know About Machine Learning (but were afraid to ask)



- two main goals: prediction vs. classification

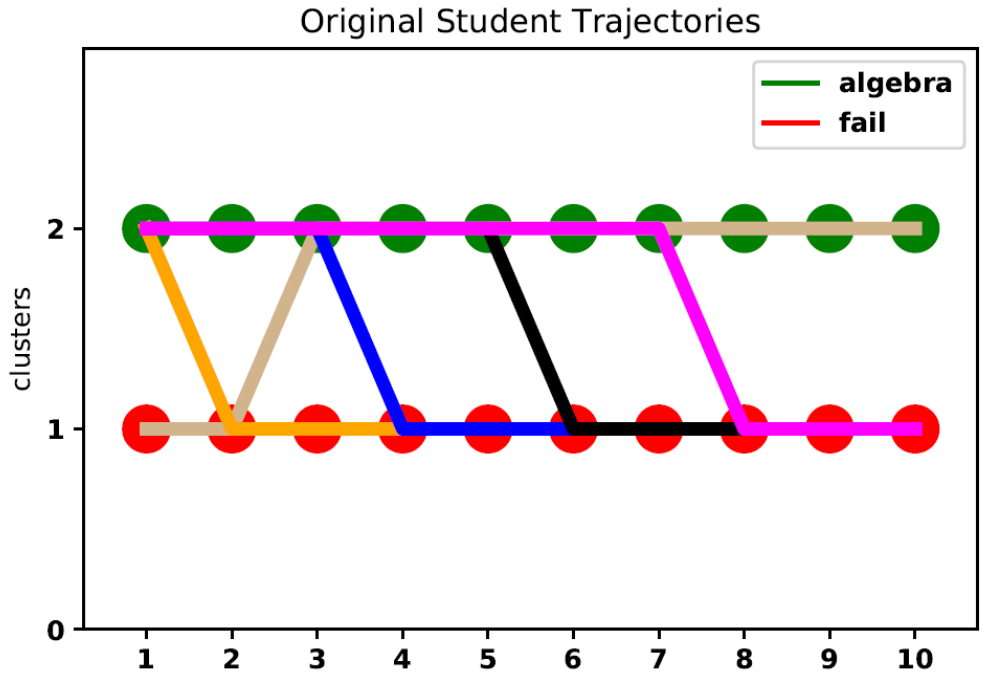
Classification With Clustering



- split objects into clusters
- describe clusters by centroids

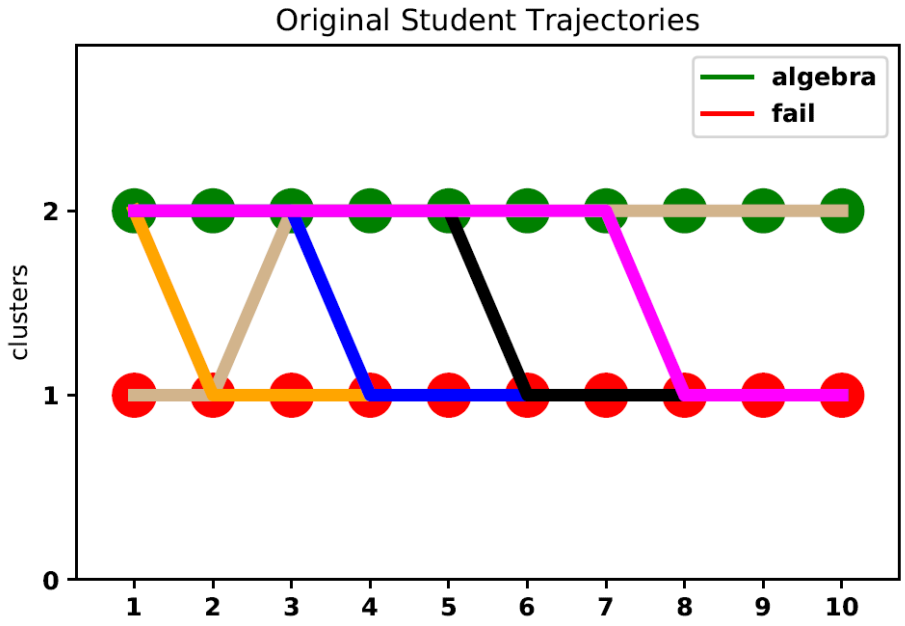
Applying Clustering Algorithms

- describe performance of large groups in simpler terms



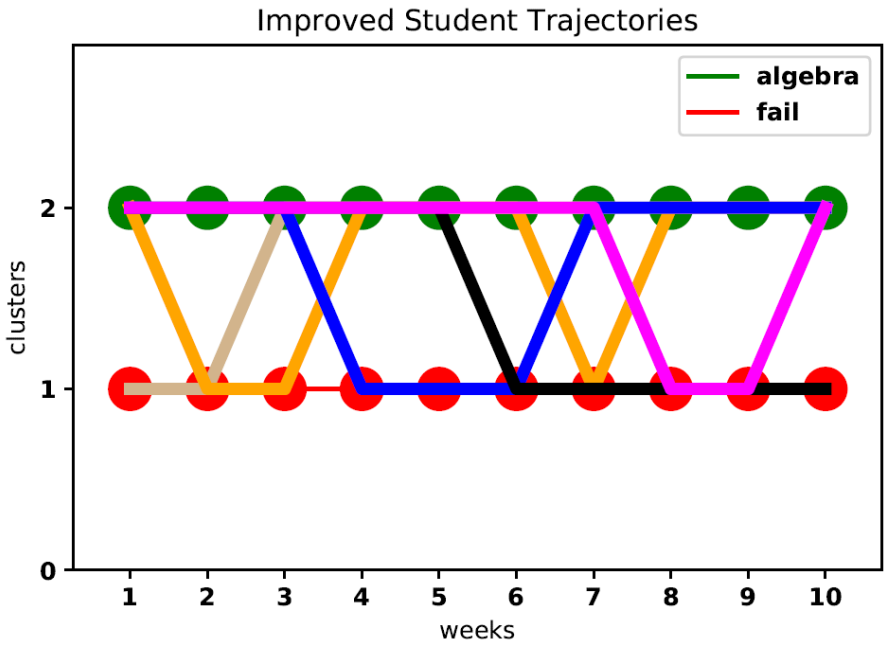
Advantages of Clustering

- similar performance – common cluster
- student learning paths – trajectories

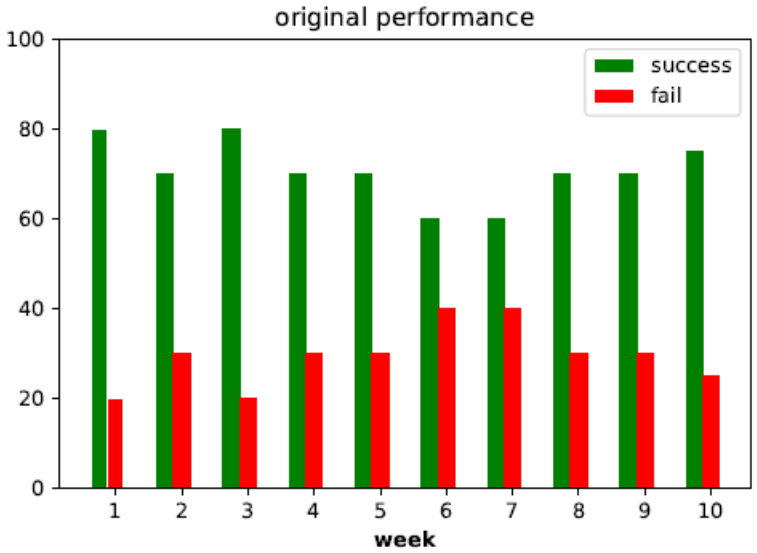


Adapting Education Delivery

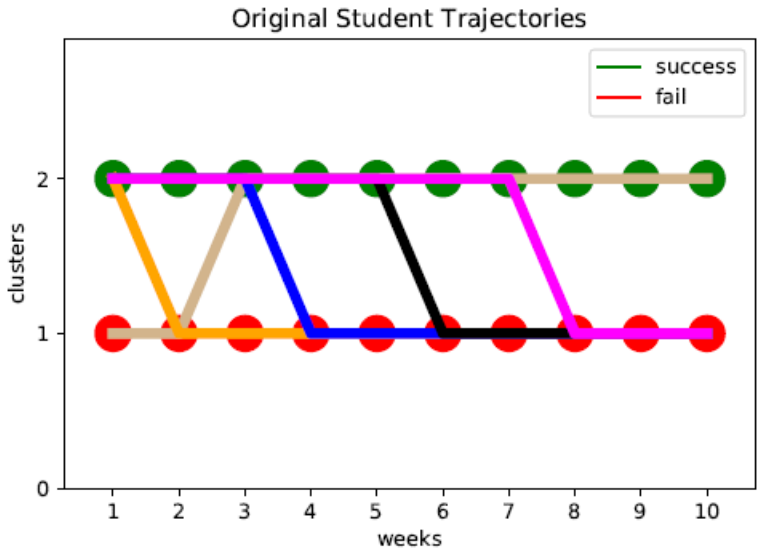
- identify “weaker” students and offer additional homework
- adapt instruction going forward

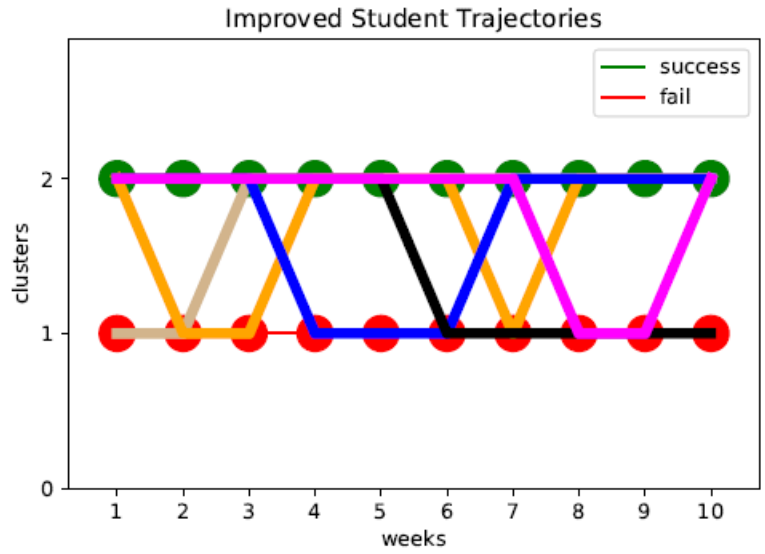


Change in Student Performance



Change in Student Trajectories





Concluding Remarks

- methodology to describe student performance in simple terms (cluster membership)
- identify “strengths” and “weaknesses” in students
- retrospective comparison across sections and course iterations
- adjust education delivery
- plan: to build such a system at Boston University