Augmenting Authentic Data Science Environments for Learning Analytics

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ABSTRACT

Unlike general learning management systems which have used fine-grained trace behaviours to understand learning processes, data science environments use discipline-specific tools such as Project Jupyter (Perez and Granger, 2015). Augmentation of these tools is necessary in order to surface learner activities in ways which might be used for adaptation (Ferguson, 2012). This is analogous to augmenting problem-solving environments for mathematics (Melis and Siekmann, 2004), where domain-specific tools are necessary for understanding learning activity. In this work, we specifically tackle the augmentation of Project Jupyter. We explain the architecture of the environment along with the types of events we are able to collect and frame research questions we aim to answer with this work.

ARE YOU A DATA SCIENCE INSTRUCTOR?

What barriers learners face while learning data science?

WEEK 1 ASSIGNMENT ⌄

WHICH QUESTION IS MOST CHALLENGING?

● # students who have attempted   ● # students who have completed
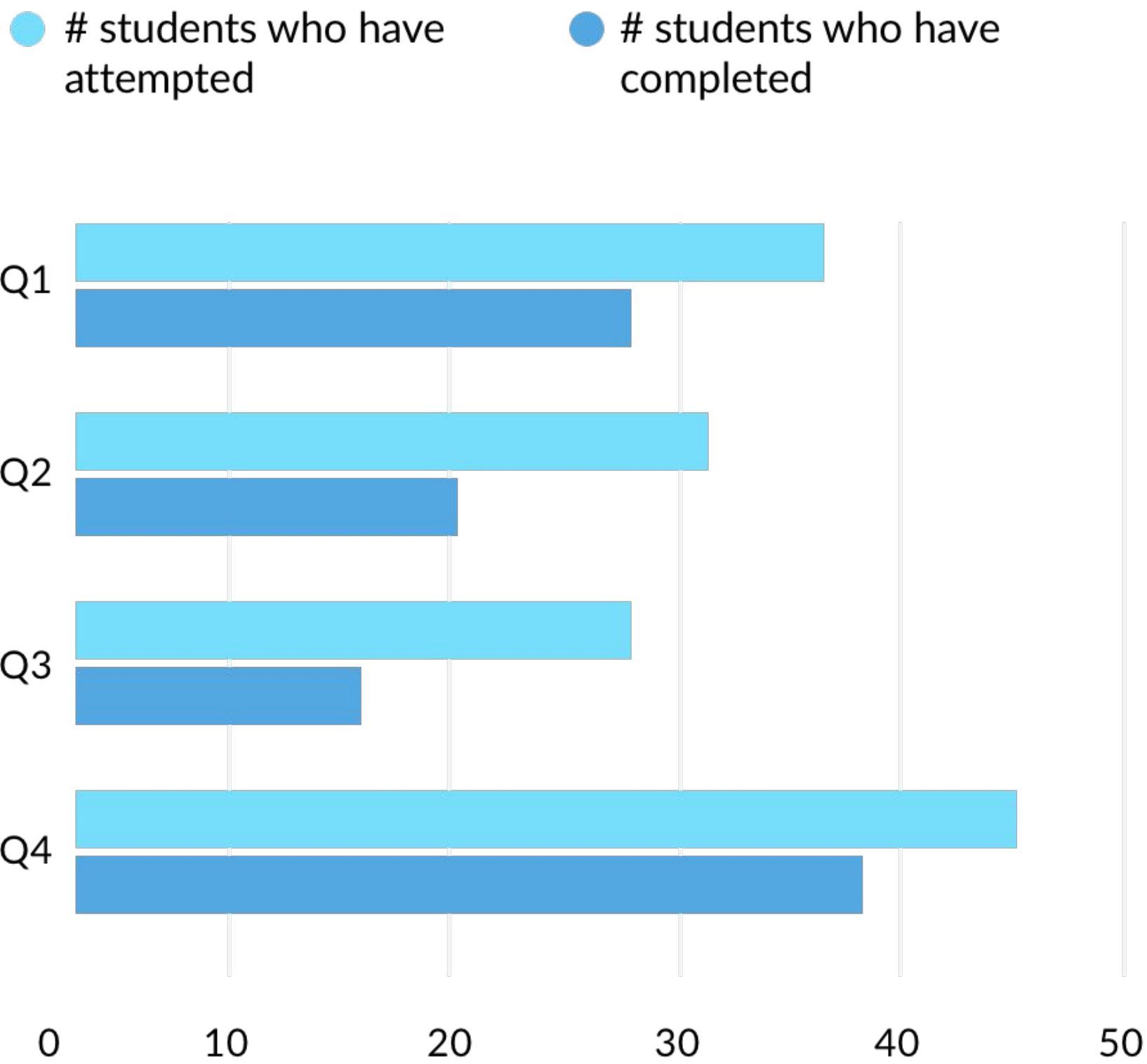
WHAT ARE THE MOST COMMON ERRORS?

Errors	Count
Type error	14,560
Name error	8,837
Syntax error	4,529
Index error	4,224
Others	1,000

ARE YOU A LEARNING ANALYTICS RESEARCHER?

Do passive learners indulge in bottom-out hint seeking behaviours?

● Clicking on "Show Hint"   ● Coding in cell
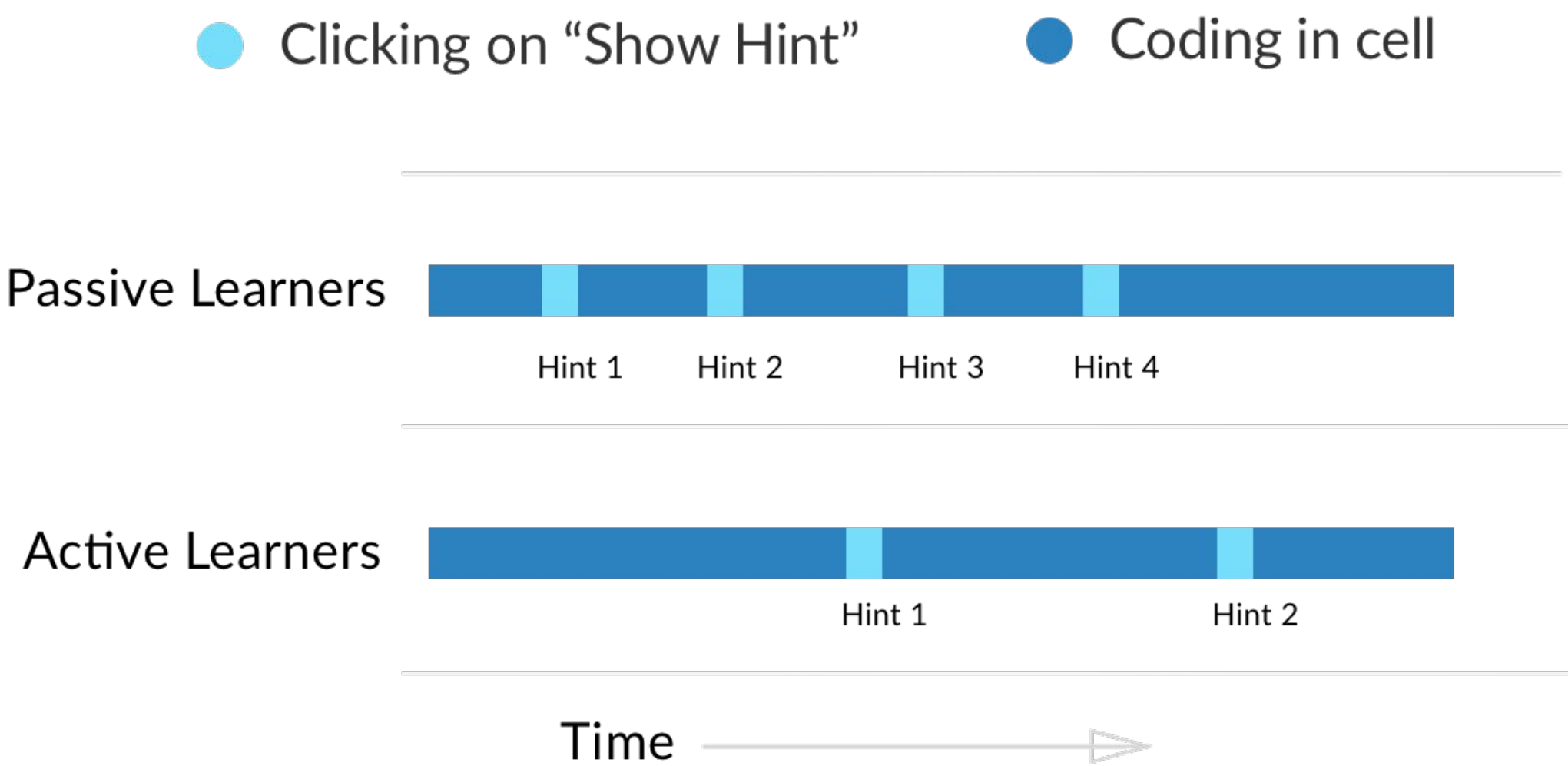
Do active learners engage in trial and error cell executions pattern?

● Active Leaners   ● Passive Learners
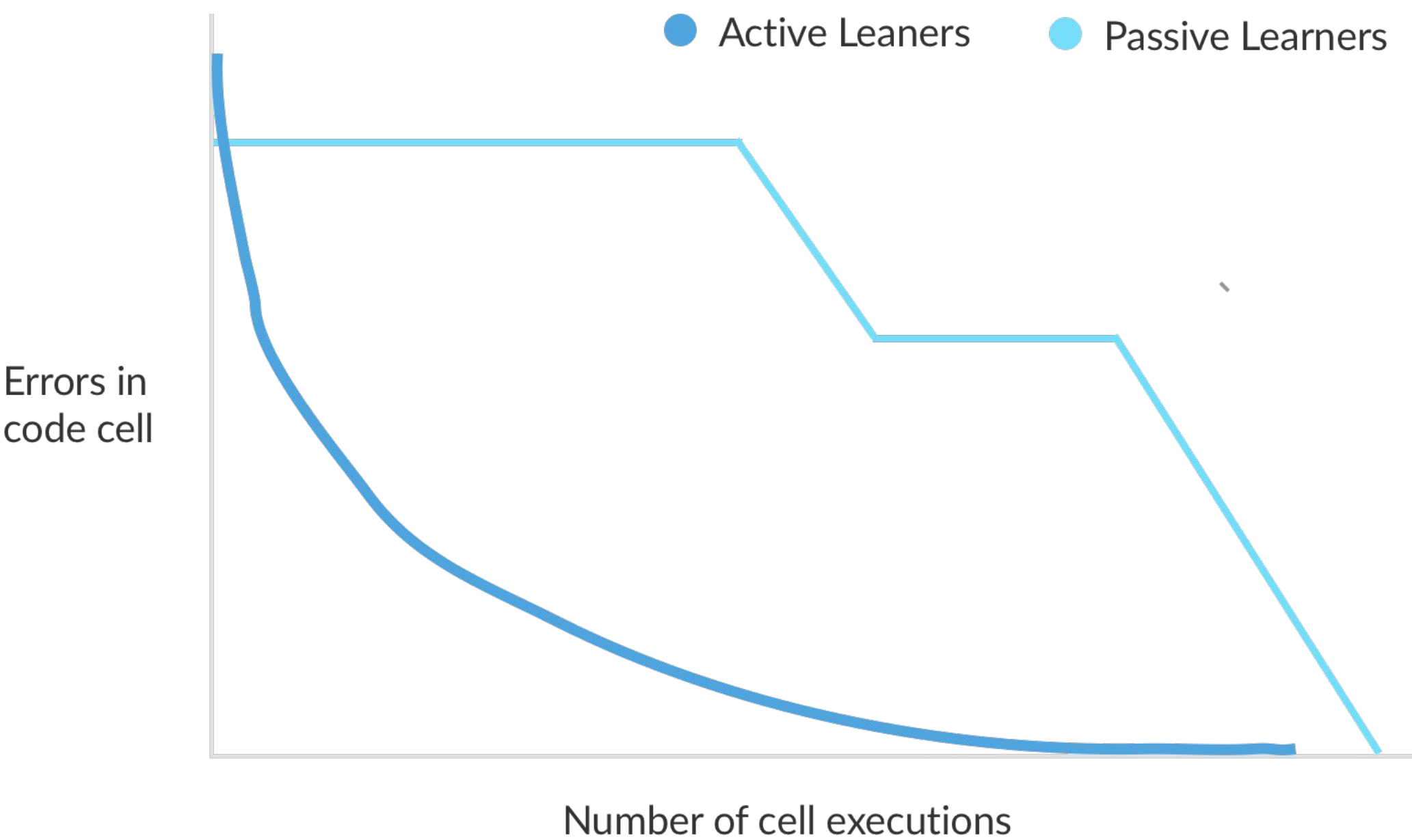
IMPLICATIONS

- Collect custom fine-grained trace data for learners
- Provide feedback to students at risk through real-time interventions
- Build novel learning experiences to teach data science

REFERENCES

- Perez, F., & Granger, B. E. (2015). Project Jupyter: Computational narratives as the engine of collaborative data science. Retrieved September, 11, 207.
- Ferguson, R. (2012). Learning analytics: drivers, developments and challenges. International Journal of Technology Enhanced Learning, 4(5/6), 304-317.
- Melis, E., & Siekmann, J. (2004, June). Activemath: An intelligent tutoring system for mathematics. In International Conference on Artificial Intelligence and Soft Computing (pp. 91-101). Springer, Berlin, Heidelberg.