iPRACTISE - What Is It?

iPRACTISE is a digital education system that provides personalized testing as guided by user input and automated control theory algorith • Goals: :

- Develop a scalable prototype for iPRACTISE that can be us graduate as well as graduate teaching of statistics
- Compare the results of personalized training to uniform train tional classroom settings

Why Personalized Education?

• Heterogeneity in Students' Knowledge:

- The diversity in student preexisting knowledge and expertise limited the scope and depth of traditional data science traini - Linear and uniform training modules preclude students who kinds of skills from entry into certain training or career paths - Homogeneous solutions to heterogeneous student body is in may serve no one well

• Explosiveness in Un-Navigated Materials:

- The digital age has allowed for unlimited sharing of training
- Selection of appropriate training materials that fit an individ ability and learning goal is similar to "finding needle in a hays



Figure 2: iPRACTISE in Application

• Computerized Adaptive Test

- iPRACTISE provides Item Response Theory (IRT; [2]) based tools to adaptively measure students' individual ability during

• Optimization of Training Dosage

- A novel control theory algorithm [3] is used to automate the individualized training modules and dosages

• Training Interface

- Training materials are tagged in various aspects, including but not limited to topic, difficulty, and expected time spent

- Instructors can create their own course structure using iPRACTISE

INDIVIDUALIZED PATHWAYS AND RESOURCES TO ADAPTIVE CONTROL THEORY-INSPIRED SCIENTIFIC EDUCATION (IPRACTISE)

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Please select programming experience required for this file

Figure 4: Example Tree: Learning Basics in R

Programming Experience: Beginner

Method: Read and try on your own

RACTISE

com/iPRACTISE-Demo

Ferm

standard error estimate you obtained using the normal distribution ation as SEa. What value of test statistic should you report?

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ns for Adaptive Test



- (mirtCAT) [1]
 - of item difficult levels



Conclusions

- personalized digital instruction

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- partment and QuantDev group at Penn State

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Computerized Adaptive Testing (CAT)

• Ongoing, individualized assessments of student's R ability using the R package, Computerized Adaptive Testing with Multidimensional Item Response Theory

- Classical testing paradigms capitalize on fixed-length tests at a fix range

- CAT selects test items that tailor continuously to an individual's ongoing ability estimate to allow for better approximation of latent ability [2]

• iPRACTISE will leverage the information from CAT to provide the optimal dosage of training materials (e.g., difficulty- and aptitude-matched)

Figure 5: Illustration of CAT

• Individual components of iPRACTISE (e.g., item bank, control theory algorithm) will be shared with the broader research community

• iPRACTISE system could be adapted for application to a wide array of educational settings, and has the potential to serve as a model for the future of

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References