

OVERVIEW AND MOTIVATION

- Goal: Provide tools to help students understand the critical concepts in Machine Learning while removing the complexity of coding and mathematical derivations
- Topics:
 - Bias-Variance Tradeoff
 - Classification Metrics
- Approach: Built Shiny apps to create interactive visualizations that allow students to explore and understand these concepts

TECHNICAL DETAILS

- Build using R Shiny
- Plotting done using plotly
- Deployed using ShinyApps.io
 - Basic Plan
 - Instance Size: 3X-Large (8GB)

Worker Settings

Max Worker Processes	3
Max Connections	50
Worker Load Factor	5 %
Connection Timeout	900 sec
Read Timeout	3600 sec
Startup Timeout	60 sec
Idle Timeout	5 sec

Instance Settings

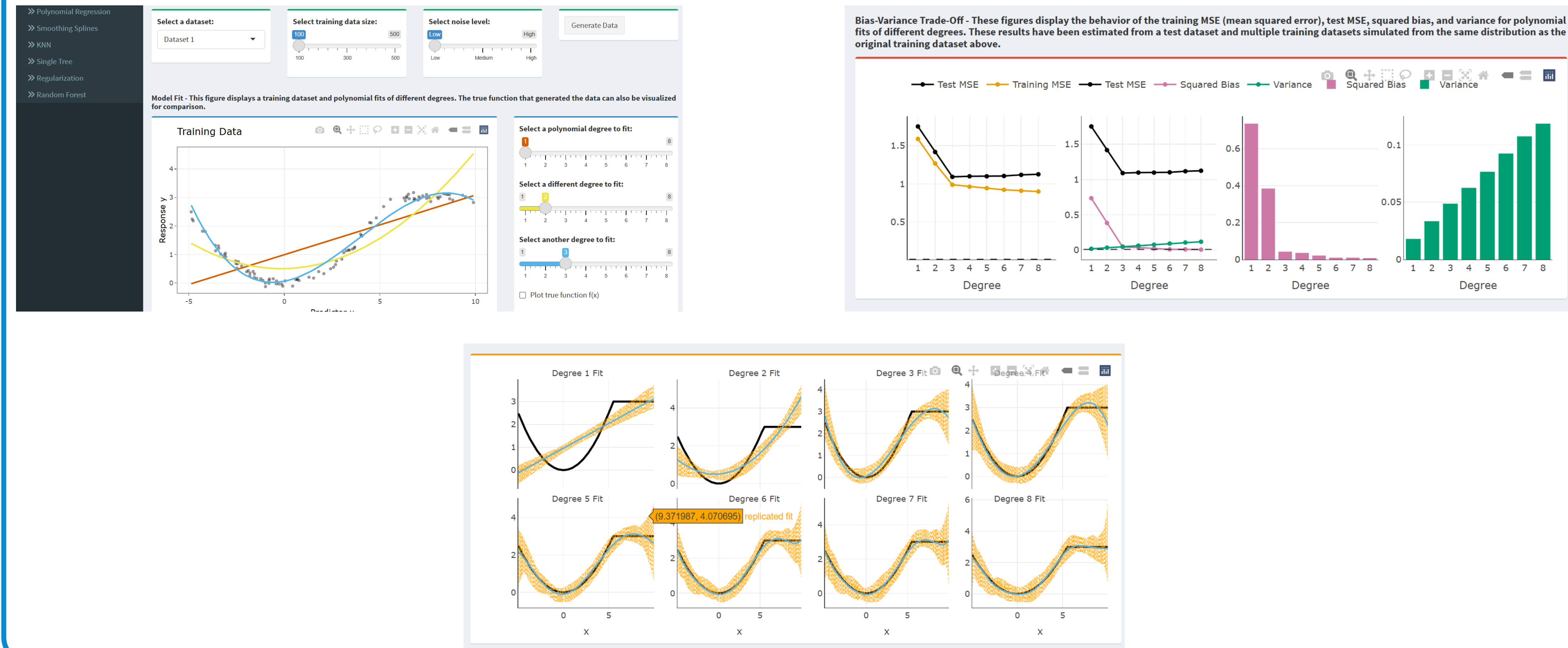
Instance Load Factor	50 %
Start Count	1

Build Settings

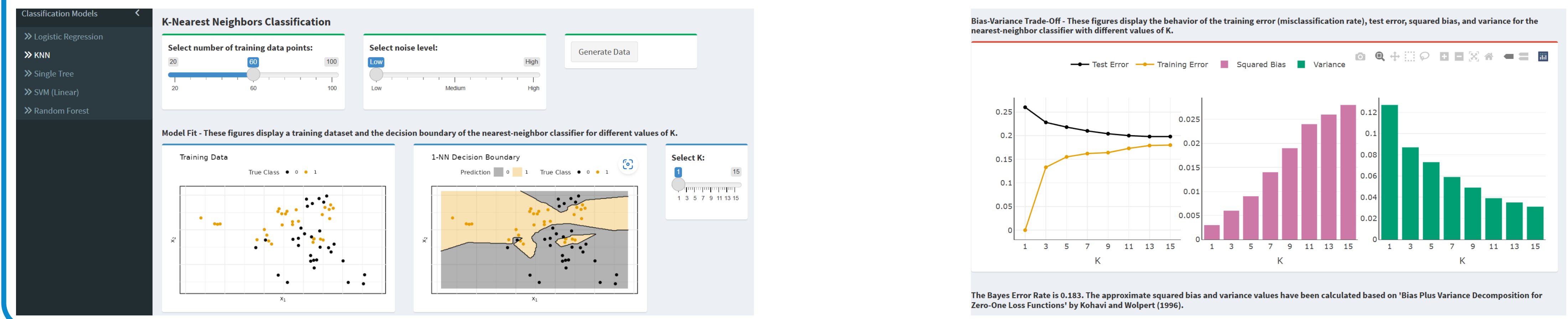
Package Cache	<input checked="" type="checkbox"/>
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- Initial Problem: Difficult to get the apps to load and change quickly for many students
- Solutions:
 - Take advantage of caching
 - Use plotly instead of ggplot
 - Increase size of instance
 - Adjust instance settings

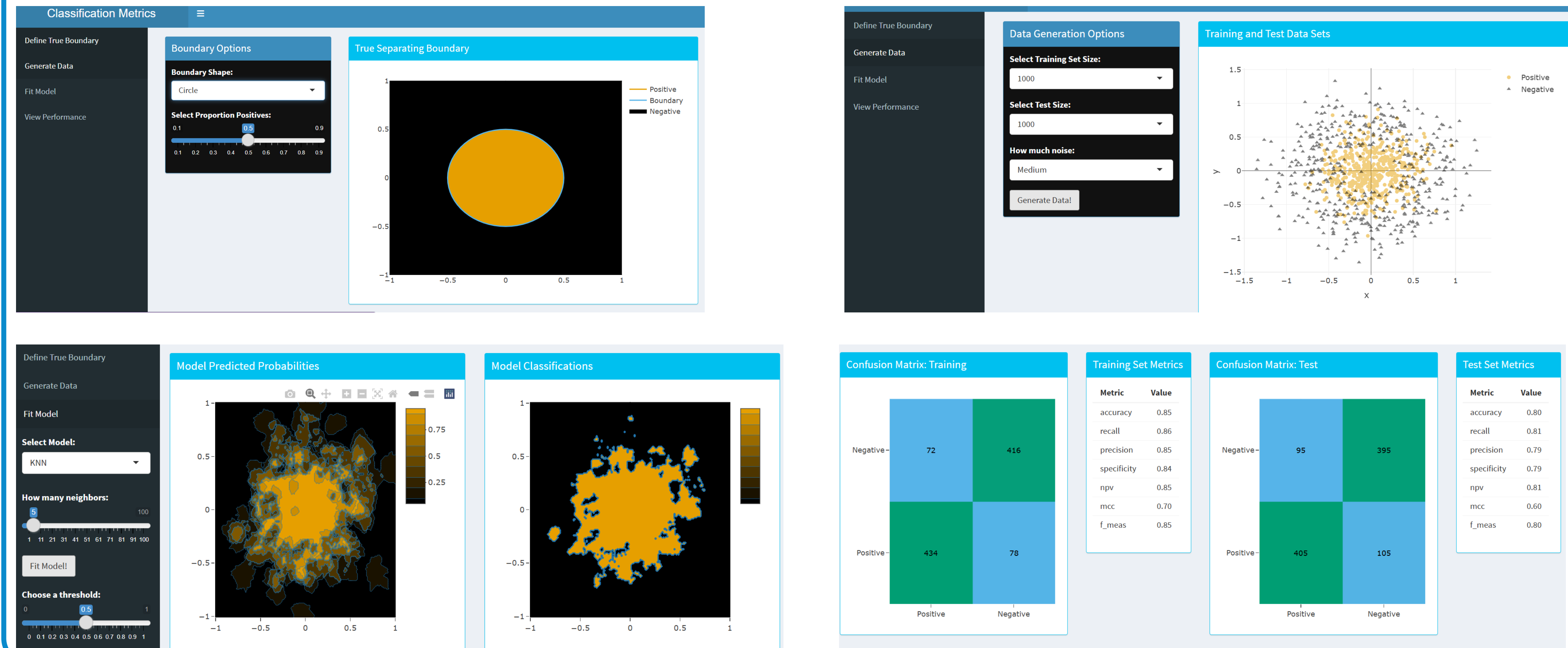
APP 1: BIAS-VARIANCE TRADEOFF REGRESSION



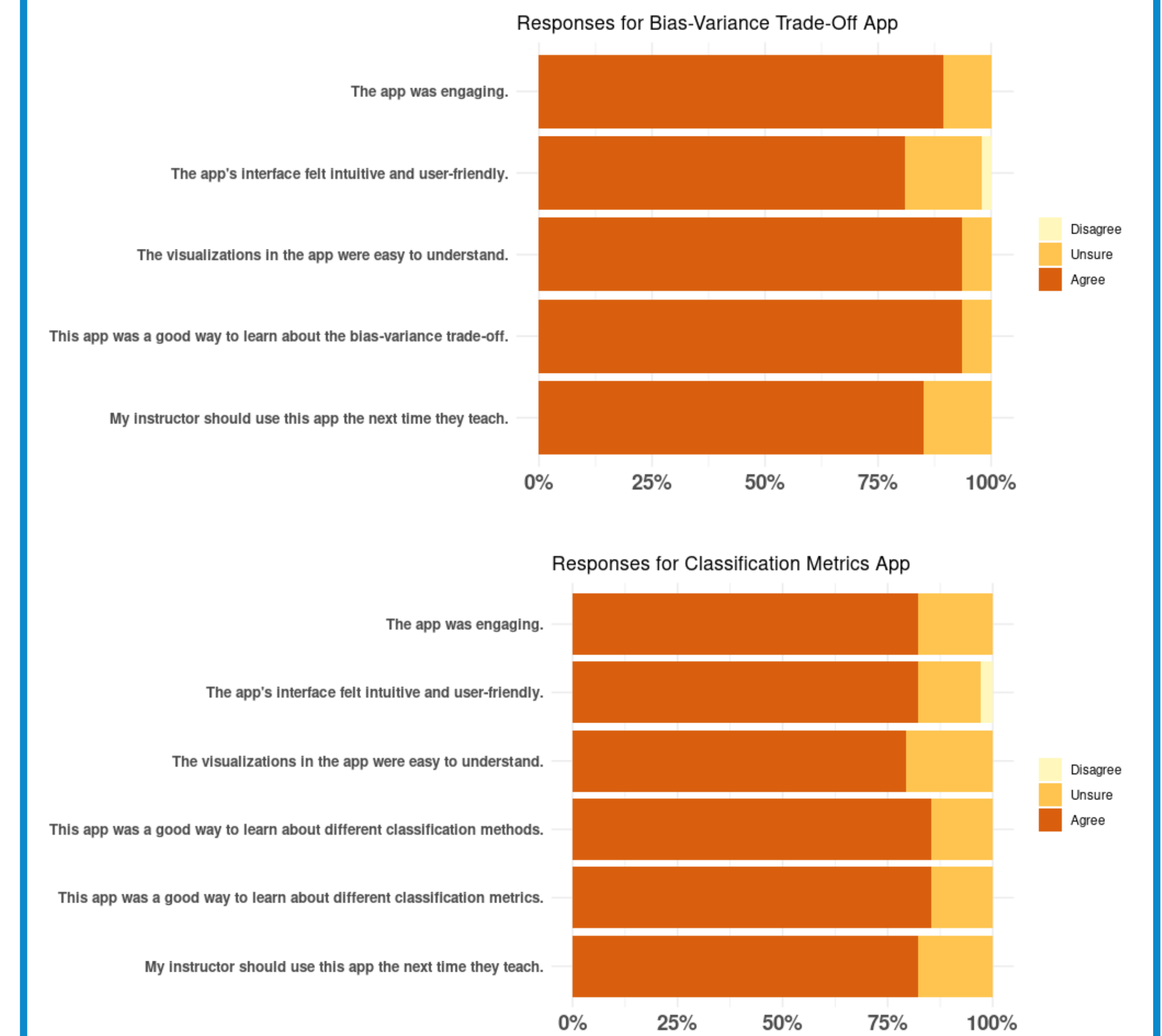
APP 2: BIAS-VARIANCE TRADEOFF CLASSIFICATION



APP 3: CLASSIFICATION METRICS



SUMMARY OF FEEDBACK



REPRESENTATIVE COMMENTS

- What did you like most about the app?
 - “It was helpful in visualizing how classification works.”
 - “I like the different methods you could use to learn about the classification metrics.”
 - “The performance tab was really nice. We could go at the end and view all of the metrics easily.”
 - “Easy to learn about the different metrics”
 - “How I was able to apply it to the concepts in class.”
- What did you like least about the app?
 - “It takes a while for the app to load when you change the input.”
 - “Slows when a lot of traffic”
- What could be improved about the app?
 - “It would be great to add short explanations for each parameter, so users can quickly understand what each control does.”
- Which features of the app were most helpful for your learning?
 - “Mainly how the noise affects ROC AUC curves. Also I like the confusion matrices.”
 - “generation of different types of dataset based on user curiosity”
 - “I liked how I could adjust things myself and instantly see the results. That hands-on part really helped things click.”