Project Plan Presentation
Predictive Claims Scoring

The Capstone Experience
Team Roosevelt Innovations Data Science

Anna Catenacci
Ayeza Imtiaz
Nicole Kuang
Jp Walsh
Yilong Xie

Department of Computer Science and Engineering
Michigan State University
Fall 2023
Project Sponsor Overview

- Headquartered in Okemos, MI
- One of largest dental insurance companies in the US
- Subsidiary of Delta Dental
- Develops software to streamline insurance operations
Project Functional Specifications

• Managing numerous dental insurance claims is time-consuming: detecting claims that are most likely to be reported with FWA (fraud, waste and abuse) can accelerate claim reviewal.

• Identify patterns in attributes are most prevalent in claims likely to be reported with FWA.

• Accelerate workflow at Delta Dental in sorting claims that need to be reviewed more carefully.
Project Design Specifications

• Tableau Dashboard:
  ▪ Display raw data from Delta Dental claims
  ▪ Graphs showing the relationships between attributes from data and the classification ML model output
  ▪ Correlation and confusion matrices

• Web App:
  ▪ Search bar to find specific past claims
  ▪ List of previously classified claims and their attributes
  ▪ Bar to paste and classify new claim and identify most important attributes
Screen Mockup: Web App Home Page
Screen Mockup: Claim Search Results
Screen Mockup: Tableau Dashboard 1
Screen Mockup: Tableau Dashboard 2
Project Technical Specifications

• Web App Deliverable:
  ▪ Built with React as an interface for ML model.
  ▪ Fetch data from Snowflake with FastAPI.
  ▪ All output and UI for business analysts here.

• Tableau Deliverable:
  ▪ Gather data from Snowflake at runtime.
  ▪ ML model connected with Tableau Python integration.
  ▪ All graphs and UI for data scientists here.
Project System Architecture

Data Scientist — Tableau — Snowflake — FastAPI — Web Server — Machine Learning Model

Business Analyst
Project System Components

• Software Platforms / Technologies
  ▪ Snowflake: Company-provided data cloud
  ▪ FastAPI: Web framework to build APIs
  ▪ React: Web App platform
  ▪ Tableau: Visual analytics platform
  ▪ Gitlab Python Technologies:
    - PyTorch and Scikit-Learn
    - Open-sourced libraries that support machine learning and data analysis
Project Risks

• Finding optimal machine learning model
  ▪ Need model that classifies which claims need further review as well as providing a percentage confidence score.
  ▪ Develop a few models and present them to client.

• Identifying most important metrics from data
  ▪ Need to find the most important factors in determining FWA among 46 attributes. Important for business-side employees.
  ▪ Fine-tune model parameters until we have clear/consistent results. Talk to client about what attributes mean in insurance business.

• Create an easy-to-understand web app
  ▪ Insurance companies work with business professionals and have many audits. Graphics need to be easy to understand and explain to encourage trust in them.
  ▪ Produce many prototypes of the web app for our client’s review.

• Switch between batch and real-time claims scoring
  ▪ Two project deliverables for business analysts and data scientists require batch and real-time claims scoring, respectively. Machine learning model must do both scoring types.
  ▪ Start model with scoring one claim and adapt to scoring many.
Questions?