# Smart Budgeting Agent

Derrick K. Gibbs–McGlaston

Capstone ITAI–2277

Instructor: Sitaram Ayyagari

# PROBLEM STATEMENT

- Why budgeting is hard
- Why categorization matters
- What gap your system solves

# PROJECT GOALS

- Automate expense categorization
- Use ML + full stack design
- Build a functional deployable system

# SYSTEM ARCHITECTURE

- Frontend (HTML/CSS/JS)
- Backend (Linear SVC pipeline
- SQLite Database
- REST pipeline diagram

# DATA PIPELINE

- Source of data
- Cleaning
- Tokenization
- Vectorization
- Train/Test Split

6

# MACHINE LEARNING MODEL

- LinearSVC
- TF-IDF
- Why SVC fits the problem

# 7 BACKEND API DESIGN

- /predict
- /transactions
- Security + performance considerations

# Frontend Integra

- Prediction form
- Live updates
- Transaction table
- UX simplicity

# 9 DEMO FLOW

- Enter transaction
- Receive prediction
- Save to DB
- View in recent table

# 10 Code Walkthrough

- Show key backend function
- Show model pipeline
- Show frontend JS

# 11 Technical Challenges

- Environment conflicts
- Broken model predictions
- Fixing label quality
- FastAPI debugging
- macOS numpy issue

# 12 Solutions Implemented

- Rebuilt model pipeline
- Added override logic
- Cleaned virtual env
- Improved training
- Stablized predictions

# 13 Evaluation Metrics

- Confusion matrix
- Classification report
- Accuracy
- Error patterns

# 14 Capstone Requirements Met

- ML model
- Full stack integration
- End-to-end system
- Demo-ready prototype

# 15 Real-World Use Cases

- Personal finance
- Fin-tech budgeting apps
- Banking transactions
- Foundations for FussBudget

# 16 Future Enhancements

- User accounts
- Cloud deployment
- Mobile app
- Multiple models
- Budget alerts
- Financial analytics dashboard

# 17 Ethical Considerations

- Data privacy
- Model bias
- Transparency
- Security consideration

# 18 Lessons Learned

- ML pipeline structuring
- Debugging real systems
- End-to-end development
- GitHub professionalism

# 19 Conclusion

- Restate what you built
- Impact of the system
- Skills demonstrated

# Thank You