

# Smart Budgeting Agent

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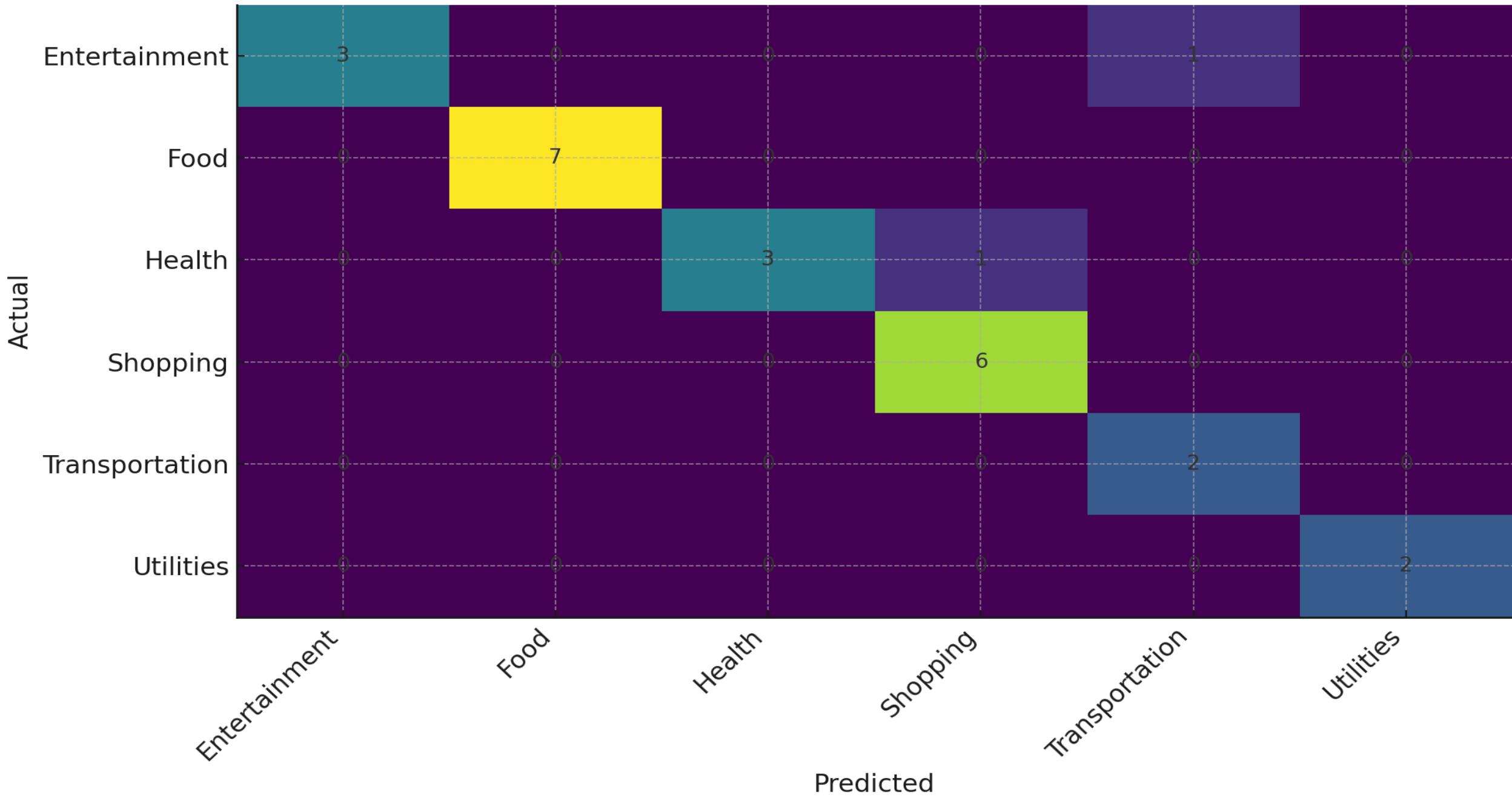
Capstone ITAI-2277

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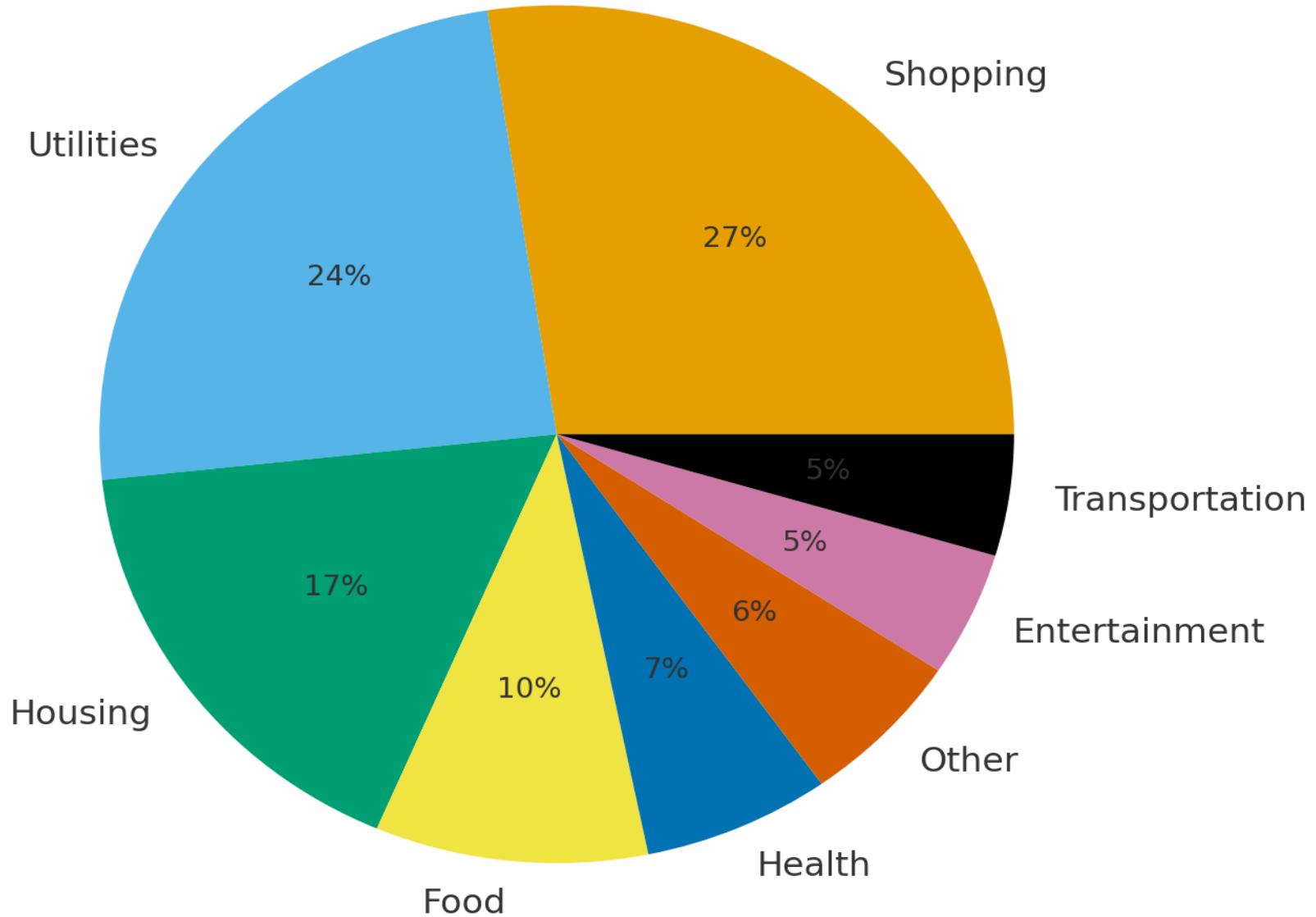
# PROBLEM STATEMENT

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

# Decision Tree Confusion Matrix (Test)



## Category Share of Spend



# 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

# MACHINE LEARNING MODEL

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

# 7 BACKEND API DESIGN

- /predict
- transactions
- Security + performance considerations

## 8 FRONTEND INTEGRATION

# Frontend Integra

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

## 9 DEMO FLOW

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



# 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

# Thank You