SE 390 01 Artificial Intelligence Projects with Python

Midterm Project Assignment

Academic Year: 2025-2026 Fall Semester
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Instructor: Assist. Prof. Dr. Emre Olca
Course: SE 390 01 - Artificial Intelligence Projects with Python
Institution: Maltepe University - Software Engineering Department
Assignment Type: Midterm Project (Group Work)
Duration: In-class activity (to be completed during class session)

1. Project Overview

This midterm assignment is structured as a real-world AI case study, inspired by the FutureCommerce AIdeathon. Students will work in teams during class time to analyze an e-commerce problem and develop an AI-powered solution proposal.

1.1 What You Will Do

- **Analyze** a real business problem in e-commerce
- **Design** an AI-powered solution concept
- **Create** a professional presentation
- **Present** your solution to the class in 5 minutes
- **Work** collaboratively in teams of 3-5 members

1.2 The Challenge

This project addresses a critical challenge in Turkey's e-commerce ecosystem: **Dead Stock Management**. Your team will propose how AI can predict and manage inventory that has high risk of becoming unsellable, thereby reducing operational costs and improving business efficiency.

2. Problem Statement

2.1 Dead Stock Definition

Dead Stock refers to inventory that:

- Remains unsold for extended periods
- Creates storage costs in warehouses
- Ties up working capital
- Requires discount campaigns or disposal strategies

2.2 Business Impact

E-commerce companies face significant losses due to dead stock:

Operational Impact:

- ↑ Storage costs
- ↓ Inventory turnover rate
- Cash flow disruption
- Discount/campaign losses
- Operational inefficiency

Customer Experience Impact:

- Product availability issues
- Delivery speed problems
- Cart abandonment rates
- Brand trust concerns
- Overall satisfaction metrics

2.3 Core Research Question

E-commerce companies face significant losses due to unsold inventory sitting in warehouses. The key challenge is predicting which products will become "dead stock" before it's too late.

Your Challenge:

"How can AI predict the risk of a product becoming dead stock in e-commerce operations?"

What Your Team Must Develop:

Your AI-powered solution should:

1. **Predict** dead stock risk scores for individual products

2. **Provide** actionable insights for inventory management decisions

3. **Demonstrate** measurable operational and financial benefits

4. **Improve** customer experience metrics (availability, delivery speed)

3. What You Need to Deliver

Your team will submit **THREE deliverables**:

3.1 Written Report (3-5 pages)

Format: PDF document

Required Sections:

1. **Cover Page**
    - Team name
    - Team members (names and student IDs)
    - Project title
    - Date
2. **Executive Summary** (½ page)
    - Brief overview of the problem
    - Your solution in 2-3 sentences
    - Key expected impact
3. **Problem Analysis** (1 page)
    - What is dead stock?
    - Why is it a critical problem?
    - Current challenges in e-commerce
    - Scale and impact of the problem
4. **Proposed AI Solution** (1-2 pages)
    - How does your solution work?
    - What AI/ML techniques would you use?
    - What data would be needed?
    - System architecture diagram

    Technical Feasibility (REQUIRED):

    - Technology stack (Python libraries, frameworks, databases)
    - Implementation approach (high-level)
    - Data pipeline architecture
    - Scalability considerations
    - Integration with existing e-commerce systems
    - Expected performance metrics
5. **Business Impact & Implementation** (1 page)
    - Expected operational improvements
    - Cost-benefit analysis
    - Customer experience benefits
    - Implementation challenges and solutions
    - Return on investment projection
6. **Conclusion & Future Work** (½ page)
    - Key takeaways
    - Next steps for implementation
    - Potential expansions

Writing Tips:

- Use clear, professional language
- Include diagrams and visuals
- Cite any sources used
- Proofread for errors
- Use AI like ChatGPT, Gemini but never copy paste.

3.2 Presentation Deck (1-10 slides)

Format: Digital presentation (Canva recommended)

Required Content:

1. **Opening Slide**
    - Team name and logo (if you have one)
    - Project title
    - Team members
2. **Problem Definition** (1-2 slides)
    - What is dead stock?
    - Why is it a problem for e-commerce companies?
    - Scale and impact of the problem
3. **AI Solution Proposal** (3-4 slides)
    - How can AI predict dead stock risk?
    - What data would you use?
    - What type of AI/ML approach?
    - System architecture diagram (must include)
    - Technology stack overview
    - How would your solution help businesses?
4. **Demo Showcase** (1-2 slides)
    - Screenshots of your mockup/prototype
    - User interface design
    - Key features demonstration
    - Demo link (if functional)
5. **Business Impact** (1-2 slides)
    - Operational benefits (cost reduction, efficiency)
    - Customer experience improvements
    - Implementation feasibility
    - Return on investment projection
6. **Conclusion** (1 slide)
    - Key takeaways
    - Expected impact summary
    - Next steps

Design Requirements:

- Professional and clean design (use Canva templates)
- Clear visualizations and diagrams
- Readable fonts and good contrast
- Consistent theme throughout

- Include demo screenshots/mockups

Presentation Time: 5 minutes per team

- Clear and concise delivery
- Demo showcase (screenshots or live if functional)
- Be ready for Q&A from instructor/class

3.3 Demo/Prototype (REQUIRED)

Minimum Requirement: You MUST create at least a basic mockup or prototype showing your solution concept.

Acceptable formats:

- **Interactive mockup** (Figma, Canva)
- **Static dashboard design** (showing the user interface)
- **Wireframes** (showing the system flow)
- **Simple web page** (HTML/CSS showing the concept)
- **Simple Python script** (showing basic prediction logic)

Where to showcase:

- Include screenshots in your presentation
- Include description in your report
- Provide link/files if digital

BONUS OPPORTUNITY (+10 points)

Fully Functional Working Demo Bonus

If you create a **fully functional, professional-quality demo** with:

- Working AI/ML implementation (even simplified)
- Professional, polished user interface
- Smooth user experience
- Live demonstration during presentation

You can earn +10 bonus points!

Examples of functional demos:

- Streamlit app with working ML model and beautiful UI
- Flask/FastAPI web app with real-time predictions
- React dashboard with backend API integration
- Gradio interface with trained model

Tools for functional demos:

- **Streamlit:** Quick Python web apps with great UI

- **Gradio:** ML model interfaces with minimal code
- **Flask + Bootstrap:** Professional web applications
- **React + Python API:** Full-stack solution
- **Deployment:** Streamlit Cloud, Heroku, Vercel (free options)

Note: This bonus is for truly fully functional working demo that goes significantly beyond the basic requirement. A simple mockup fulfills the requirement; a production-ready demo earns the bonus!

4. Evaluation Criteria

Your project will be evaluated based on the following criteria (Total: 100 points + 10 Fully Functional Working Demo Bonus):

4.1 Problem Understanding (15 points)

- **Clarity:** Do you clearly explain what dead stock is?
- **Impact:** Do you demonstrate understanding of why this is important?
- **Research:** Did you consider real-world implications?

What we're looking for:

- Clear definition of the problem
- Understanding of business impact
- Recognition of operational and customer experience effects

4.2 Solution Design & Technical Feasibility (20 points)

- **AI Approach:** Is your proposed AI solution logical and appropriate?
- **Innovation:** Does your solution show creative thinking?
- **Technical Details:** Have you specified technology stack and implementation approach?
- **Architecture:** Is there a clear system architecture with diagrams?
- **Data Strategy:** Have you identified appropriate data sources and pipeline?
- **Scalability:** Have you considered how the solution scales?

What we're looking for:

- Clear explanation of how AI would help
- Specific AI/ML techniques mentioned (LSTM, Random Forest, etc.)
- Technology stack identified (Python, TensorFlow, databases, etc.)
- System architecture diagram included
- Data pipeline and processing approach
- Integration strategy with e-commerce platforms
- Realistic implementation considerations

4.3 Demo/Prototype (10 points)

- **Completeness:** Does your mockup/prototype show the key features?

- **User Interface:** Is the design clear and user-friendly?
- **Functionality:** Does it demonstrate the core concept?
- **Quality:** Is it professional and well-executed?

What we're looking for:

- At minimum: Clear mockup or wireframe
- User interface design for the solution
- Key features visualized
- Professional presentation
- Screenshots in report and presentation

Note: A basic mockup/prototype is REQUIRED. Fully functional working demos earn bonus points (see below).

4.4 Business Viability (10 points)

- **Value Proposition:** What value does your solution create?
- **Implementation:** How practical is your solution?
- **Impact:** What measurable improvements would you expect?
- **ROI:** Return on investment considerations

What we're looking for:

- Clear business benefits
- Cost-benefit awareness
- Quantified impact projections
- Scalability considerations

4.5 Written Report Quality (20 points)

- **Content:** Comprehensive coverage of all required sections
- **Clarity:** Clear writing and logical flow
- **Professionalism:** Well-formatted, proofread document
- **Visuals:** Appropriate use of diagrams and figures

What we're looking for:

- Complete 3-5 page report
- Professional academic writing
- Good structure and organization
- Proper citations if sources used

4.6 Presentation Quality (25 points)

- **Design:** Is your presentation professional and visually appealing?
- **Clarity:** Is your message clear and well-organized?
- **Delivery:** Did you present confidently and within time?
- **Teamwork:** Did all team members contribute to the presentation?

What we're looking for:

- Professional Canva design
- Logical flow of information
- Clear speaking and good timing (5 minutes)
- Effective team collaboration

FULLY FUNCTIONAL WORKING DEMO BONUS (+10 points)

Beyond the basic required demo, you can earn +10 bonus points for an fully functional working demo:

Requirements for Bonus:

- **Fully Functional:** Actually works with real predictions/outputs
- **Professional UI:** Polished, beautiful user interface
- **Live Demo:** Successfully demonstrated during presentation
- **Technical Implementation:** Uses actual AI/ML libraries and models

What makes it "fully functional working":

- Goes far beyond a mockup - it's a real application
- Professional quality that could be shown to actual companies
- Smooth user experience with no major bugs
- Well-designed interface with good UX principles
- Working AI/ML backend (even if simplified)

Examples of fully functional working demos:

- Streamlit app with trained model making real predictions
- Flask web app with professional Bootstrap UI and ML backend
- React dashboard connected to Python API with model inference
- Gradio interface with custom-trained model

This is truly EXTRA CREDIT for effort!

5. Team Structure

5.1 Team Size & Naming

- **Maximum:** 3 members
- **Formation:** You can form your own teams
- **Team Name:** Each team MUST choose a creative team name
    - Example: "StockSense", "AI Inventory Masters", "DeadStock Busters", "SmartStock Solutions"
    - Your team name will be used in all submissions and presentations

5.2 Team Roles (Suggested)

For effective teamwork, consider dividing responsibilities:

3-person team example:

- **Member 1:** Problem research & business analysis
- **Member 2:** AI solution design & technical approach
- **Member 3:** Presentation design & coordination

6. Grading Breakdown

Component	Weight	Details
Problem Understanding	15%	Clarity, impact, research quality
Solution Design & Technical Feasibility	20%	AI approach, innovation, tech stack, architecture, data pipeline, scalability
Demo/Prototype	10%	Mockup/prototype quality, UI design, feature demonstration
Business Viability	10%	Value proposition, implementation feasibility, ROI
Written Report	20%	Content completeness, clarity, professionalism
Presentation Quality	25%	Design, delivery, timing, teamwork
Base Total	**100%**	
BONUS: Fully Functional Working Demo	**+10%**	Fully functional, professional, deployed application
Maximum Possible	**110%**	

7. Timeline

During Class Session

Time Management Tips:

- **Don't spend too much time on team name** - 5 minutes max
- **Start report early** - it's mandatory and takes time
- **Use templates** - Canva has great templates to save time
- **If attempting bonus:**
  - Allocate 30-45 min for technical feasibility analysis
  - Allocate 45-60 min for simple demo (only if team has coding skills)
  - Don't sacrifice core requirements for bonuses!

Note: Exact timing will be adjusted based on class size and number of teams.

8. Tips for Success

8.1 Common Mistakes to Avoid

- Vague technical details - be specific!
- No architecture diagram - this is essential
- Generic mockup - make it specific to your solution
- No business impact - tie back to real benefits
- Poor report organization - follow the required structure
- Going over time - practice and stick to 5 minutes
- No team name - choose a creative name!

9. Frequently Asked Questions

Q: Do we need to write code?
A: For the basic requirement: No, a mockup/prototype is sufficient. For the +10 bonus: Yes, you need a working, deployed application.

Q: Is a demo required?
A: YES! At minimum, you must create a mockup or prototype showing your solution. Screenshots must be in your presentation.

Q: What's the difference between required demo and bonus demo?

- **Required (10%):** Mockup, wireframe, or prototype (can be static designs)
- **Bonus (+10%):** Fully functional, deployed web application with working AI/ML

Q: Do we need technical details in the report?
A: YES! Technical feasibility section is required, including technology stack, architecture, and implementation approach.

Q: Can we use AI tools like ChatGPT for help?
A: Yes, but you must understand and be able to explain everything you include. You can use AI for brainstorming, writing assistance, and even code generation.

Q: What if we don't know much about e-commerce?
A: That's fine! The case description provides context. Do quick online research during work time.

Q: Can teams have different numbers of people?
A: Yes, 1-3 members. Allocate work appropriately based on team size.

Q: Must we use Canva?
A: Canva is strongly recommended for its professional templates, but PowerPoint or Google Slides are acceptable if they look professional.

Q: What if we run out of time?
A: Prioritize in this order: 1) Report with technical details, 2) Basic demo mockup, 3) Presentation, 4) Practice. Don't sacrifice core requirements for the bonus.

Q: What counts as a "mockup" for the required demo?
A: Figma design, Canva interface mockup, wireframes, or even well-designed screenshots showing how your system would look.

Q: How can we earn the +10 bonus?
A: Build a real, working application that:

- Actually functions (makes predictions, shows results)
- Has professional UI/UX
- Is deployed online (Streamlit Cloud, Heroku, etc.)
- Can be demonstrated live during presentation

Q: Is the report mandatory?
A: YES! The 3-5 page written report is required and worth 10% of your grade.

Q: What technical details should be in the report?
A: Technology stack (Python, TensorFlow, etc.), specific algorithms (LSTM, Random Forest), system architecture diagram, data pipeline, scalability considerations, and integration approach.

Q: Can we build the bonus demo if we're not great at coding?
A: Focus on the required mockup first! Only attempt the bonus if you have coding skills and extra time. A perfect mockup + solid report is better than a buggy demo.

Q: Do we need to choose a team name?
A: YES! Each team must have a creative name used in all submissions and presentations.

10. Submission

What to submit:

1. **Written Report** (PDF, 3-5 pages)
    - File name: SE390_Team[TeamName]_Report.pdf
    - Example: SE390_TeamStockSense_Report.pdf
    - Must include technical feasibility section
2. **Presentation** (PDF or Canva link)
    - File name: SE390_Team[TeamName]_Presentation.pdf
    - Example: SE390_TeamStockSense_Presentation.pdf
    - Must include demo screenshots
3. **Demo Files/Link** (minimum mockup)
    - Mockup files (Figma link, PowerPoint, images)
    - Or screenshots of your prototype

When to submit:

- At the end of class session (or before presentations begin)

How to submit:

- Via: [BlackBoard/Email]

Good Luck!

Remember: This project tests your ability to think strategically about AI solutions AND communicate them professionally. Every team can succeed with the core requirements - the bonus is for truly extra work!