Final Project Report – Pattern Sense

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1. INTRODUCTION
   1.1 Project Overview: A deep learning system to classify fabric patterns.
   1.2 Purpose: Automate and streamline the fabric pattern recognition process in the textile industry.

2. IDEATION PHASE
   2.1 Problem Statement: Manual pattern classification is inefficient.
   2.2 Empathy Map Canvas: Frustrations of textile manufacturers and needs for automation.
   2.3 Brainstorming: Explored multiple model architectures, UI ideas, and deployment modes.

3. REQUIREMENT ANALYSIS
   3.1 Customer Journey Map: Users upload images → system classifies pattern → feedback provided.
   3.2 Solution Requirement: Registration, classification, feedback with functional and NFRs.
   3.3 Data Flow Diagram: Input → Preprocessing → CNN → Output.
   3.4 Technology Stack: React.js, Flask, TensorFlow, MongoDB, AWS.

4. PROJECT DESIGN
   4.1 Problem-Solution Fit: Strong alignment with users' pain points and behavior.
   4.2 Proposed Solution: Real-time fabric pattern recognition via CNN.
   4.3 Solution Architecture: Client-server design with REST APIs and ML backend.

5. PROJECT PLANNING & SCHEDULING
   5.1 Project Planning: Two sprints with epics on data handling and model deployment.

6. FUNCTIONAL AND PERFORMANCE TESTING
   6.1 Performance Testing: Achieved 91.2% validation accuracy, 93.1% after fine-tuning.

7. RESULTS
   7.1 Output Screenshots: Attached in appendix with UI, classification, and API response images.

8. ADVANTAGES & DISADVANTAGES
   Advantages: Fast, scalable, user-friendly; Disadvantages: requires quality image input.

9. CONCLUSION
   Deep learning can significantly improve pattern recognition in textile industries.

10. FUTURE SCOPE
   Extend classification to texture, fabric type; integrate AR-based pattern visualization.

11. APPENDIX
   Source Code: Provided in GitHub.
   Dataset Link: Refer to attached file.
   GitHub & Demo Link: https://github.com/example/pattern-sense