1. INTRODUCTION

1.1 Project Overview

This project focuses on classifying various fabric patterns using deep learning. It aims to automate fabric type detection (e.g., striped, floral, polka dot, plain) to assist in the textile and fashion industry using computer vision techniques.

1.2 Purpose

The purpose is to reduce manual errors in fabric classification, speed up quality checks, and introduce AI-driven automation into the fabric production and sales workflow.

2. IDEATION PHASE

2.1 Problem Statement

Manually sorting or identifying fabric patterns is time-consuming, subjective, and error-prone. The need for an accurate, automated system for classifying patterns is increasing in textile applications.

2.2 Empathy Map Canvas

Stakeholders: Fabric manufacturers, quality inspectors, designers

Needs: Quick classification, reliable automation, pattern accuracy

Feelings: Need for accuracy, frustration from manual errors

Tasks: Scan fabric images, predict pattern type automatically

2.3 Brainstorming

Ideas included using CNNs, transfer learning models like ResNet, MobileNet, and real-time classification using mobile or embedded vision systems.

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

From uploading fabric images to getting automated pattern classification results on-screen.

3.2 Solution Requirement

- Image dataset of various fabric patterns
- Deep learning model
- UI to display results
- Training and evaluation pipeline

3.3 Data Flow Diagram

- Input: Fabric image -> Preprocessing -> Model Prediction -> Output: Pattern label

3.4 Technology Stack

- Python, TensorFlow/Keras
- OpenCV
- Jupyter Notebook
- Google Colab for training

4. PROJECT DESIGN

4.1 Problem Solution Fit

CNNs are suitable for image classification tasks. Transfer learning allows faster development with good accuracy.

4.2 Proposed Solution

A pretrained CNN model (e.g., MobileNetV2) fine-tuned on a labeled dataset of fabric patterns.

4.3 Solution Architecture

- Input Layer
- Feature Extraction via Pretrained CNN
- Dense layers for classification
- Softmax Output for pattern labels

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

- Week 1: Dataset collection & preprocessing
- Week 2: Model design and training
- Week 3: Testing & result analysis
- Week 4: Documentation & report writing

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Model accuracy, precision, recall, and F1-score evaluated on test data. Accuracy achieved: 92% (example).

7. RESULTS

7.1 Output Screenshots

Include:

- Fabric image input
- Model prediction result
- Training accuracy/loss curves

8. ADVANTAGES & DISADVANTAGES

Advantages:

- Fast and automatic classification
- High accuracy with transfer learning
- Scalable for large datasets

Disadvantages:

- Needs GPU for training
- Accuracy depends on dataset quality
- Struggles with low-resolution or mixed patterns

9. CONCLUSION

The project successfully demonstrated that deep learning can accurately classify fabric patterns. It offers a scalable, AI-powered solution for the textile industry.

10. FUTURE SCOPE

Future Scope:

- Real-time classification via mobile apps
- Include more pattern types
- Deploy as a web app for wider access

11. APPENDIX

Source Code: [GitHub Link]

Dataset Link: [Kaggle/Custom Dataset Link]

GitHub & Project Demo Link: [Your GitHub or YouTube demo]