Project Design Phase

Solution Architecture

Date: 15 June 2025

Team ID: LTVIP2025TMID34516

Project Name: Pattern Scene - Classifying Fabric Patterns Using Deep Learning

Maximum Marks: 4 Marks

Solution Architecture Overview

Solution architecture bridges the gap between business needs and AI-powered classification of fabric patterns. This architecture ensures the delivery of an accurate, scalable, and user-friendly system. It includes multiple layers: image preprocessing, model inference, user interaction, storage, and administrative controls.

Key Architectural Components

1. User Interface - Web/mobile interface for fabric image upload and result display.

2. Preprocessing Layer - Handles image resizing, noise reduction using OpenCV.

3. Model Inference Layer - CNN-based deep learning model (TensorFlow/PyTorch).

4. Storage - Uses AWS S3 / Google Cloud Storage for storing uploaded images.

5. Database - MongoDB or Firebase to track user inputs and prediction results.

6. Feedback System - Lets users flag incorrect results and suggest corrections.

7. Admin Dashboard - Provides visual metrics on model performance and usage.

8. Authentication Layer - OAuth/JWT for secure user authentication.

9. Deployment Infrastructure - Dockerized deployment via AWS/GCP Kubernetes/Cloud Run.

Simplified Data Flow

```
User Upload -> Preprocessing -> Model Classification -> Output Pattern
         -                                  -
```

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Feedback

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Admin Panel

Store Results

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User Interface / API / DB