Project Design Phase
Solution Architecture

Date	27 June 2025
Team ID	LTVIP2025TMID39904
Project Name	Pattern Sense: Classifying Fabric Patterns using Deep Learning
Maximum Marks	4 Marks

Solution Architecture for Pattern Sense

Overview:
The solution architecture for *Pattern Sense* bridges the manual challenges of fabric pattern classification with a robust, AI-powered automation system. It outlines the structure and flow of the deep learning model, data handling, user interaction, and system deployment.

Key Goals of This Architecture:

1. **Find the Best Technology to Solve the Problem**

    - Utilize Convolutional Neural Networks (CNNs) to classify fabric images into pattern types (e.g., floral, stripes, checks).

    - Choose lightweight, fast, and scalable frameworks like TensorFlow or PyTorch for model development.

2. **Describe the System to Stakeholders**

    - Present an end-to-end solution that includes:
      • Image acquisition via cameras or uploads
      • Preprocessing pipeline
      • Trained CNN model for classification
      • Web interface for user input/output display
      • Integration capability with existing factory systems

3. **Define Features, Phases, and Requirements**

    - **Features:** Upload/scan fabric, auto-classify pattern, display result with confidence level

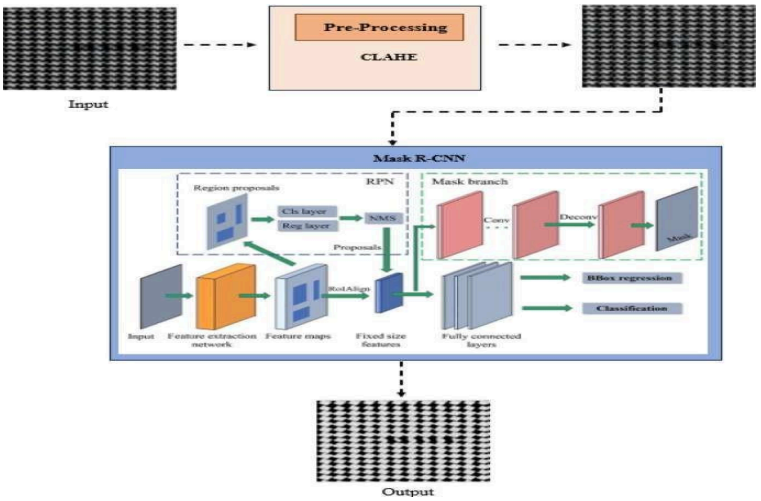
    - **Phases:**

        - Data collection & labeling

        - Model training & evaluation

        - Frontend/backend development
        - Deployment & testing
    - **Requirements:**
        - High-quality labeled dataset
        - GPU support for training
        - Real-time inference engine
        - Simple web dashboard for usability

4. **Provide Development Specifications**
    - **Model Input:** RGB image (128x128)
    - **Model Output:** Pattern class label + confidence score
    - **Backend:** Python Flask/Django
    - **Frontend:** HTML/CSS with minimal JavaScript
    - **Deployment:** Local server or cloud (AWS/GCP) with GPU support
    - **Performance Target:** ≥ 90% accuracy, < 100 ms inference time



Reference: https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/