**Pattern Sense:**

**Classifying Fabric Patterns using Deep Learning**

**Submitted by:**  
**SAI KRISHNAM NAIDU GANDI**  
**Roll No:22Q71A4222**  
**Department of CSM**  
**Avanthi Institute of Engineering and Technology**

**Team ID:** **LTVIP2025TMID37480**

**Introduction**

This project focuses on developing a system called **Pattern Sense** that classifies fabric patterns using deep learning. The system uses **convolutional neural networks (CNNs)** to identify fabric designs such as **stripes, polka dots, florals, and geometric prints**. Pattern Sense enhances efficiency in textile, fashion, and interior design industries by automating the classification process.

**Overview**

Pattern Sense is a **deep learning-based model** that recognizes and classifies different fabric patterns with high accuracy. It leverages image data and CNN architectures to support decision-making for designers, manufacturers, and quality control teams.

**Pre-requisites**

To build and run this project, basic understanding of the following is required:

* Python programming
* Deep Learning concepts (CNN, image preprocessing)
* Flask web framework
* HTML/CSS basics

**Required Python Packages**

Install these packages using terminal or Anaconda Prompt:

nginx

CopyEdit

pip install numpy

pip install pandas

pip install matplotlib

pip install scikit-learn

pip install tensorflow

pip install Flask

**Project Objectives**

* Define the image classification task
* Collect and preprocess fabric pattern datasets
* Train deep learning models (CNN)
* Evaluate model performance
* Build a web interface to upload and classify images

**Project Flow**

1. User uploads fabric image via web form
2. Image is processed and passed to the deep learning model
3. Predicted pattern class is displayed on screen

**Project Structure**

cpp

CopyEdit

pattern\_sense\_app/

├── app.py

├── model.h5

├── static/

├── templates/

│ └── index.html

**Data Collection and Pre-processing**

**Dataset:**  
Use public image datasets of fabric patterns (e.g., from Kaggle or UCI).

**Preprocessing Steps:**

* Import required libraries
* Load and resize images
* Normalize pixel values
* Label and encode classes
* Split data into training and testing sets

**Model Building**

* Use **Convolutional Neural Networks (CNN)** for image classification
* Train on labeled fabric pattern images
* Evaluate model using metrics like accuracy, precision, and recall

**Application Building**

* **Frontend:** HTML form (index.html)
* **Backend:** Flask app (app.py)
* **Output:** Predicted pattern class shown on screen after image upload

**Example Scenarios**

**Scenario 1: Fashion Industry**  
Designers and manufacturers use Pattern Sense to classify and catalog patterns efficiently, improving design and inventory workflows.

**Scenario 2: Textile Quality Control**  
The system flags pattern defects, ensuring only high-quality fabrics reach production and distribution.

**Scenario 3: Interior Design**  
Interior designers can match fabrics to design themes by automatically identifying fabric patterns from suppliers or swatches.

**Technical Architecture**

* **Data Pipeline:** Load and preprocess image data
* **Model:** CNN trained on fabric patterns
* **Web App:** Flask handles requests, prediction, and response
* **UI:** HTML/CSS-based interface for user uploads

**Conclusion and Future Work**

This project demonstrates how **deep learning** can automate fabric pattern classification with high accuracy. In the future, the system can be enhanced with:

* Real-time image classification
* Graphical dashboards for insights
* A mobile version of the app
* Support for more complex or custom fabric patterns