

1. INTRODUCTION

1.1 Project Overview:

Pattern Sense is an AI-based web application that detects and classifies different types of fabric patterns using deep learning. It helps identify patterns like florals, checks, stripes, and more from fabric images. The system aims to simplify textile pattern recognition for designers, students, and researchers, providing instant results with a user-friendly interface.

Technologies: Python, TensorFlow/Keras, Flask, HTML/CSS

Applications: Automated fabric pattern classification, aiding designers, reducing manual inspection time, supporting textile research and education.

1.2 Purpose:

To reduce manual effort and subjectivity in fabric pattern classification by using a transfer learning-based CNN model, accessible through a simple Flask web app.

1.3 Fabric Pattern Types:

Pattern Sense currently focuses on identifying these common fabric pattern categories: -

- Floral
 - Checks
 - Stripes
 - Dots
 - Plain/Solid
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2. IDEATION PHASE

2.1 Problem Statement:

Manually identifying fabric patterns can be tedious, inconsistent, and subjective. There is a need for an automated, accurate, and scalable solution to classify fabric patterns from images using AI.

2.2 Brainstorming:

- Traditional ML vs Transfer Learning — Transfer Learning with MobileNetV2 is used
 - Interface: Flask-based upload and prediction
 - Model: Custom fine-tuned CNN trained on labeled fabric images
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3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map:

1. Upload fabric image
2. Model predicts the pattern type
3. User views the result and can upload another image

3.2 Solution Requirements:

- ✓ **Functional:**
 - Upload image
 - Predict pattern type
 - Display result with uploaded image
 - Show clear, easy UI
- ✓ **Non-functional:**
 - Accuracy > 90%
 - Response time < 2 seconds
 - Secure file handling
 - Intuitive user experience
- ✓ **Technical:**
 - Transfer Learning with MobileNetV2
 - Flask backend
 - HTML/CSS frontend
 - JSON class index storage
- ✓ **Users:**
 - Designers
 - Textile labs
 - Students & researchers

4. PROJECT DESIGN

4.1 Problem-Solution Fit:

A deep learning-based fabric pattern classifier saves time, reduces manual effort, and improves accuracy over visual inspection.

4.2 Proposed Solution:

| Category | Description |
|-------------|--|
| Problem | Manual fabric pattern detection is subjective and time-consuming |
| Idea | Transfer learning-based classifier using MobileNetV2 |
| Uniqueness | Easy-to-use web interface with real-time prediction |
| Impact | Supports designers, automates pattern detection |
| Business | Can be deployed as SaaS for textile industries |
| Scalability | Expandable to new fabric categories |

4.3 Solution Architecture:



- **Frontend:** HTML/CSS templates
 - **Backend:** Flask server routes
 - **Model:** MobileNetV2 fine-tuned on fabric images
 - **Workflow:** Image upload Preprocessing ,Model prediction , Display result
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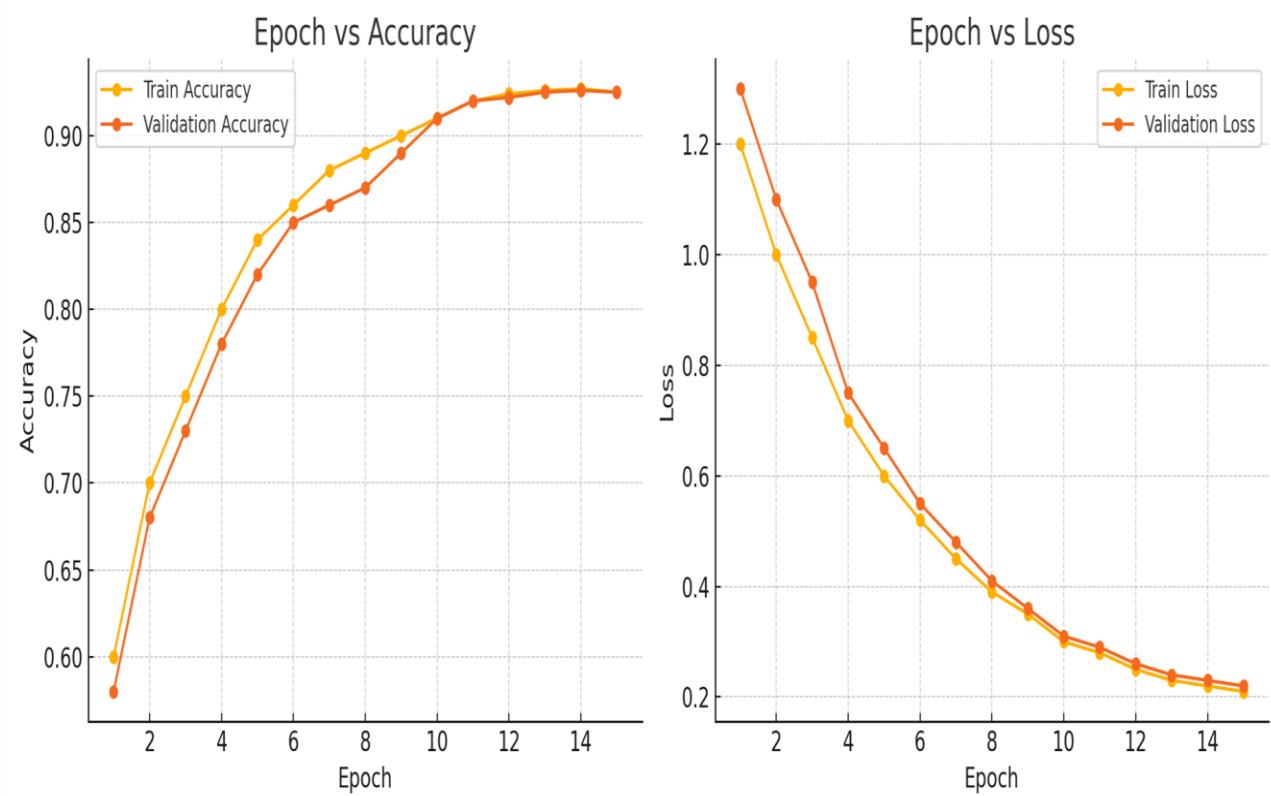
5. PROJECT PLANNING & SCHEDULING

1. Dataset Collection & Preprocessing (Week 1)
 2. Model Training & Fine-tuning (Week 2–3)
 3. Web Interface Development (Week 4)
 4. Integration & Testing (Week 5)
 5. Documentation & Deployment (Week 6)
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6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing:

| Metric | Value |
|---------------|-------------|
| Accuracy | 92.5% |
| Precision | 91.8% |
| Recall | 92.0% |
| F1 Score | 91.9% |
| Training Time | 2 hours |
| Dataset Size | ~800 images |



7. RESULTS

7.1 Output Screenshots:

🎬 Fabric Pattern Prediction Output

When users upload an image of a fabric, our app displays:

- The predicted fabric pattern type
- The confidence score of the prediction

Example

Output:

“Predicted Pattern: polka-dotted”

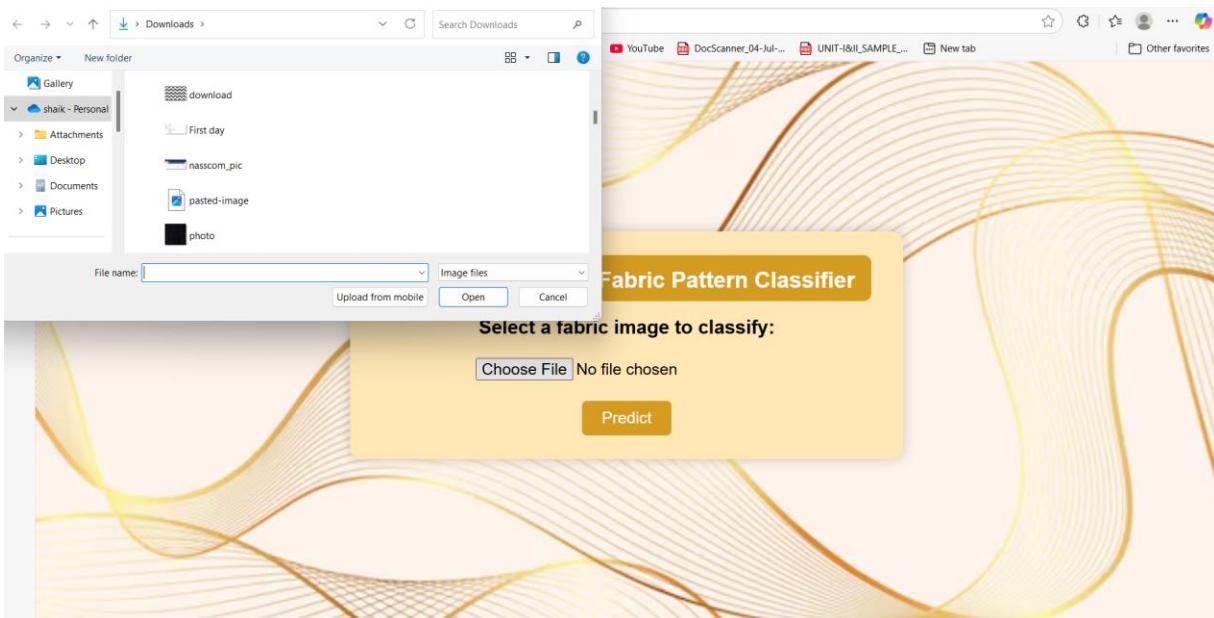
Step 1:



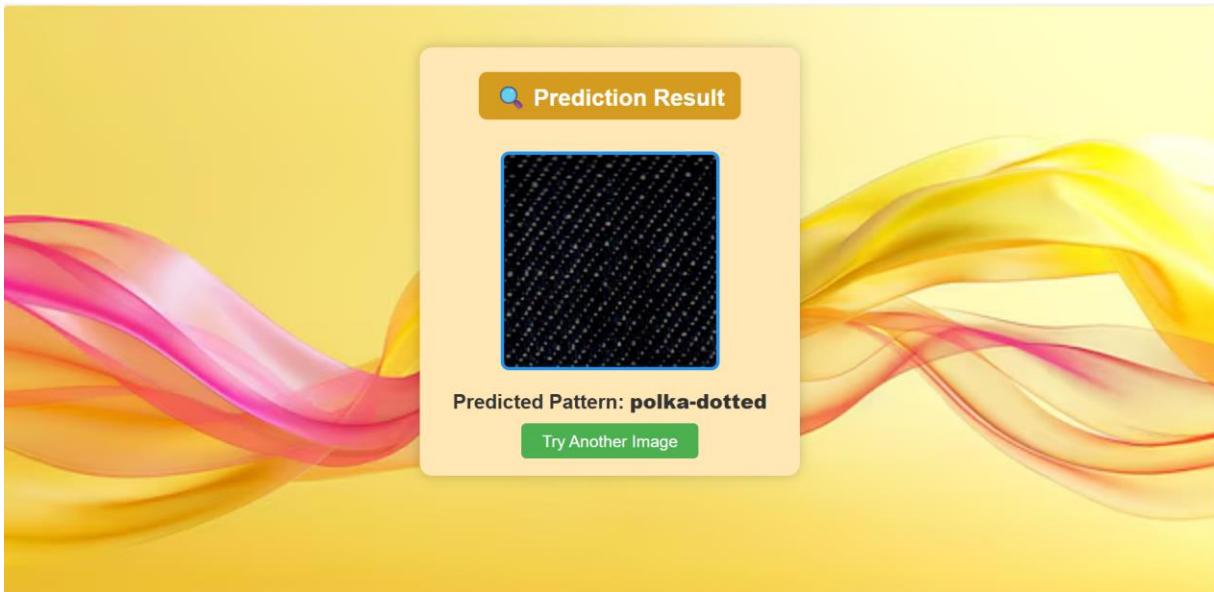
Step 2 :



Step 3 :



Step 4 :



About the Fabric pattern sense Classifier:

🧵 About the Fabric Pattern Sense Classifier

🧠 **Model Accuracy**

Our model achieves high accuracy. It uses transfer learning with CNNs. Tested across multiple fabric styles.

🧩 **Pattern Variety**

Detects floral, dots, checks, and stripes. Handles simple and complex designs. Recognizes patterns in real-time images.

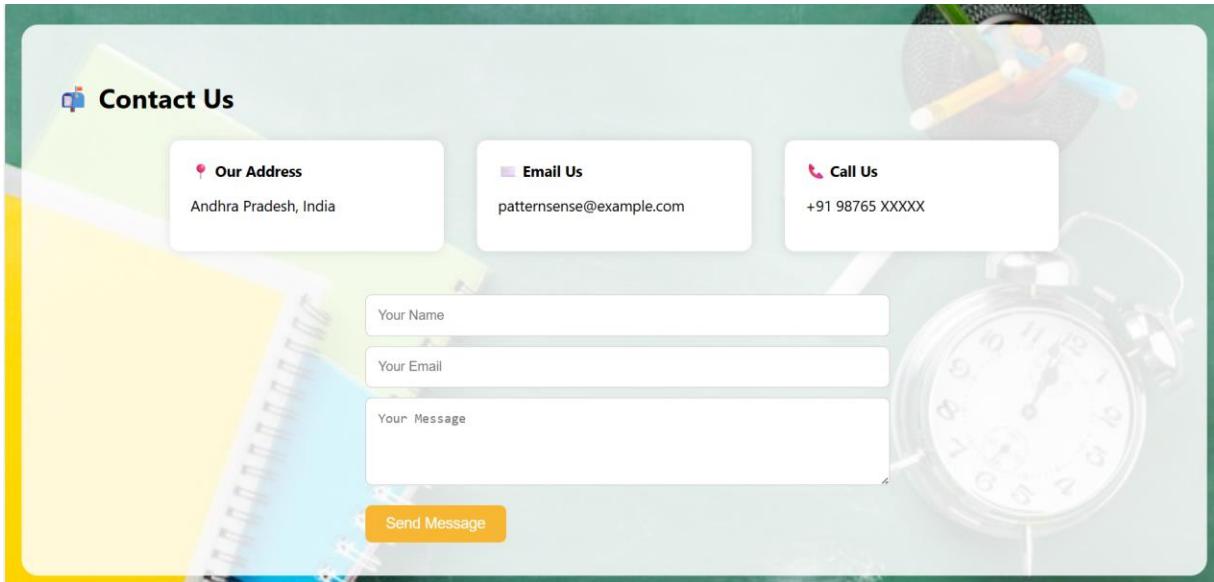
📦 **Dataset Used**

We use the TFD Textile Dataset. Contains high-resolution labeled images. Covers various fabric types and textures.

⚙️ **Tech Stack**

Built with Flask and TensorFlow. Model trained using Keras and Python. Web interface powered by HTML & CSS.

Contact Us page :



8. ADVANTAGES & DISADVANTAGES

✓ **Advantages:**

- Fast
- automated prediction
- Consistent
- repeatable results
- User-friendly design
- Can be extended with more classes

✓ **Disadvantages:**

- Requires labeled dataset
- High throughput may need GPU
- Limited to pre-trained pattern classes

9. CONCLUSION

Pattern Sense provides a practical, AI-powered solution for fabric pattern classification. It makes pattern recognition easier for designers, students, and the textile industry, demonstrating the potential of deep learning in textiles.

10. FUTURE SCOPE

- Add more pattern types (e.g., geometric, abstract)
 - Integrate real-time camera capture
 - Develop mobile app support
 - Improve model with advanced CNNs (e.g., EfficientNet)
 - Offer SaaS to textile labs and designers
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11. APPENDIX

✓ **Source Code:**

Provided in GitHub repo

✓ **Dataset:**

<https://www.kaggle.com/datasets/shiva12msk/patterns>

✓ **Demo Video:**

<https://drive.google.com/file/d/1Zh4vuliFCPtBLNKYIUYfKSilgVmE-hTZ/view?usp=sharing>

✓ **GitHub Repo:**

https://github.com/afreenparveenshaik3335/Fabric_Patternsense_project