

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
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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

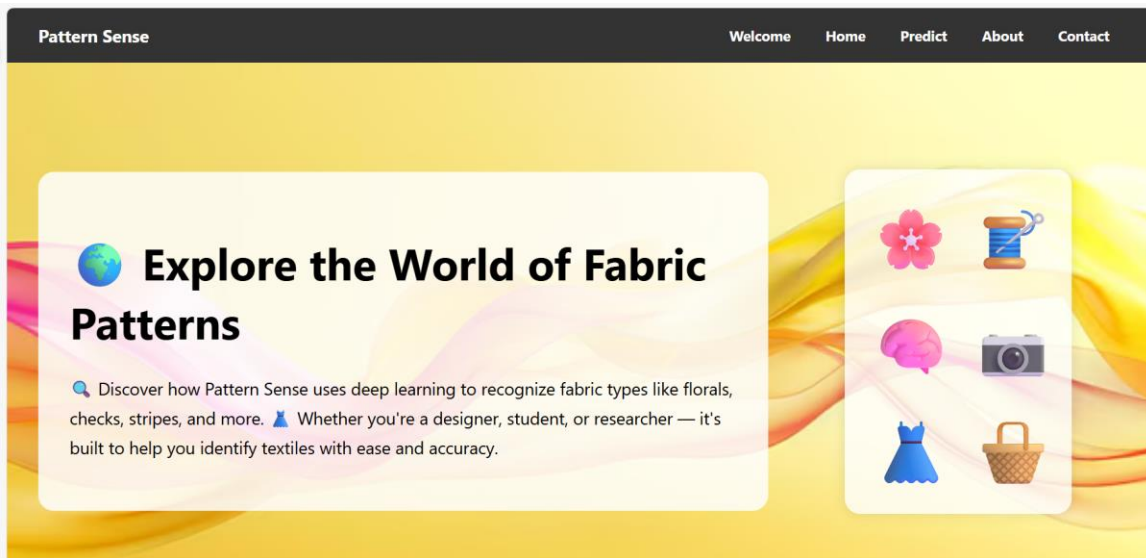
7. RESULTS

7.1 Output Screenshots:

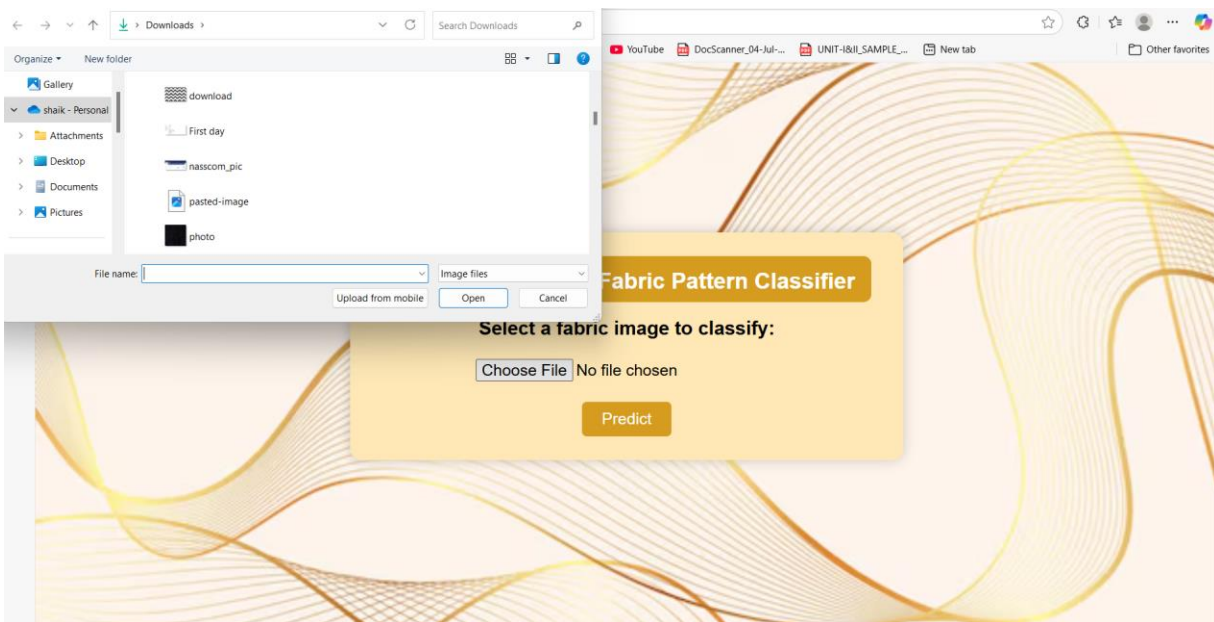
Step 1:



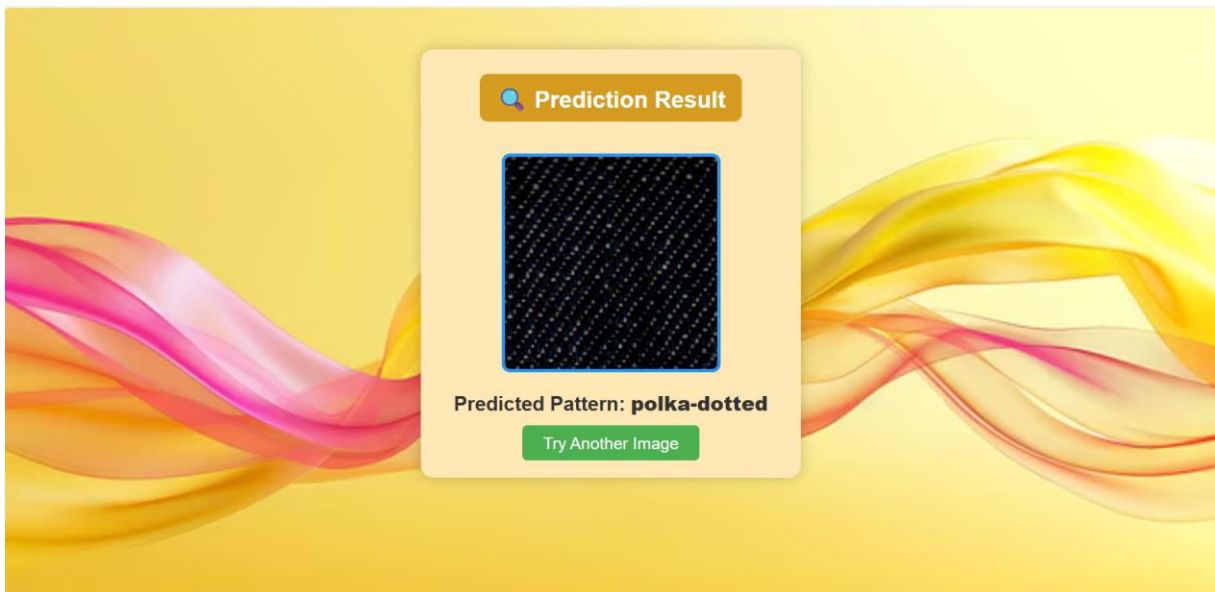
Step 2 :



Step 3 :



Step 4 :



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
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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_Patternsence_project