Ideation Phase

Date	31 January 2025
Team Id	LTVIP2025TMID41819
Project Name	Pattern Sense: Classifying fabric patterns using deep learning
Maximum Marks	4 Marks
Project Members	5

Patterns Sense: Classifying Fabric Patterns Using Deep Learning

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Step 1: Team Collaboration & Problem Statement

Problem Statement:

How can deep learning be applied to accurately classify fabric **patterns** (e.g., floral, geometric, striped, paisley, abstract) to support design, manufacturing, and digital applications?

Team Roles:

- Machine Learning Engineer – model architecture and training
- Computer Vision Specialist – preprocessing and pattern detection
- Textile Pattern Expert – taxonomy of pattern types
- Data Curator – dataset creation and annotation
- UI/UX Designer – interface for classification tool
- Product Manager – coordination and goal tracking

Step 2: Pattern-Centric Idea Listing & Grouping

Raw Ideas (Only Patterns):

- Use CNN models (ResNet, EfficientNet) for pattern recognition
- Train with labeled dataset of specific pattern types (floral, striped, etc.)
- Apply data augmentation focused on rotation, symmetry, and scale
- Add synthetic patterns using GANs to balance classes
- Use Vision Transformers (ViT) for complex, repetitive motifs
- Implement segmentation of multi-pattern fabrics before classification
- Develop a pattern similarity tool (using Siamese networks)
- Unsupervised clustering to discover hidden pattern styles
- Create a user-upload interface for instant pattern prediction
- Integrate classifier with digital fabric catalogs (search/filter by pattern)
- Extract symmetry and repetition metrics as pattern descriptors

Grouped Ideas by Category:

Category	Ideas
Model Approaches	CNNs, ViTs, Siamese Networks
Dataset Strategy	Labeled datasets, GANs for synthetic data, augmentation for symmetry
Pattern Features	Symmetry detection, pattern segmentation
Applications	Web classifier, search/filter by pattern, visual similarity tool
Exploratory Methods	Clustering hidden pattern types, motif-based grouping

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Step 3: Pattern-Focused Idea Prioritization

High Feasibility / High Value	High Value / Low Feasibility
CNN-based pattern classifier Rotational & symmetry-aware augmentation Web upload tool for pattern classification	Vision Transformers for detailed motif learning Synthetic pattern generation with GANs Pattern segmentation from mixed designs
Low Feasibility / Low Value	**Low Value / High Feasibility**
Real-time edge deployment in textiles Mixed-reality pattern exploration	Simple K-means clustering Off-the-shelf model without domain tuning

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Next Steps

Phase 1:

- Build and train CNN-based classifier
- Use curated labeled pattern dataset
- Launch web tool to upload and detect patterns

Phase 2:

- Integrate attention mechanisms (ViTs)
- Develop pattern segmentation pipeline
- Introduce pattern similarity search

Phase 3:

- Expand dataset with synthetic patterns
- Explore unsupervised pattern taxonomy
- Connect classifier to industry design platforms