# A Machine Learning – Based Web Application for Regional Fabric Store Recommendation

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## ABSTRACT

Finding the required cloth at the local fabric store requires time and effort. Customers can use our website to find the required cloth at their convenience without wasting time sifting through numerous retailers. Customers that are pressed for time will find this feature helpful. Retailers may enhance their sales by making it available online. The merchants can locate a particular fabric in the textile store using the database that is readily available. The merchants can service more customers in less time because to this automation.

The difficult process of pattern identification is what makes this application worthwhile. We can now provide the best possible match of the required fabric and patterns thanks to computer vision, machine learning algorithms and digital image processing techniques, which are essential in applications to identify patterns in photographs. To further help in making the best suggestions, a questionnaire about the cloth is also very useful. In addition, we can propose a nearby fabric store that has the requested fabric for the customers using this application.

## I INTRODUCTION

The work of customers and shop owners is made more convenient by fabric pattern recognition-based textile store recommendations. Consumers may quickly find the local fabric shop in their neighbourhood by sitting in their own homes and asking for the cloth they need. Yet, business owners can simply boost their sales. Customers may easily and quickly find the cloth they need by logging onto this web application, which ultimately saves (or reduces) time. Digital image processing software, machine learning algorithms and OpenCV

can be used to accomplish all of these. If the exact pattern is not matched, this application goes beyond just matching specific patterns by additionally offering more relevant searches.

**Keywords**: CBIR, Flask, OpenCV-python, Feature extraction, Feature matching, colour histograms, KNN algorithm, Chi-square distances, Feature database, Product database.

# II PROBLEM STATEMENT

In our cities today, there are many textile stores. However, a consumer must manually look through all the stores when they want to buy cloth till the appropriate fabric is found in stores. Customers are forced to spend valuable time doing it. Numerous internet retailers were developed as a solution to this issue. We no longer need to look for the needed cloth thanks to these online retailers. However, this technique of ordering fabric takes a long time to deliver. To provide a solution to these problems, our neighbourhood textile store recommends using fabric pattern matching to make customers shop for their required fabric easily by knowing whether the fabric is present or not. If present in which nearest store it is located?

Operating fabric stores presents various challenges for store owners as well. To give clients prompt service, they must assign a large number of employees. They must run a lot of commercials to boost their store's sales. Shopkeepers will receive a large number of consumers by using this programme, negating the need for additional advertising. Information about the exact location of the fabric in the store is also available on our website. With this knowledge, the merchant can quickly serve customers without the use of salespeople.

# III LITERATURE SURVEY

Initial inquiries with various tailors from our neighbourhood and various textile stores enabled us to understand the utility and importance of developing this particular type of application.
In our inquiry, we collected information regarding the rate of unavailability of material in a particular store we visited, the market share occupied by a regional fashion store, the different types of patterns and colours available, and most importantly, the lack of digitalization in regional fashion stores as they can’t afford digital advertisement services.
Regarding image processing, we received information from various sources available on the internet, as mentioned below.

[1] TITLE: New Development of the Image Matching Algorithm

AUTHOR: Xiaoqiang Zhang, Zhao Feng

Theimage-matching process and also the image-matching algorithm based on many parameters like grey value, feature, frequency domain analysis, neural network, and semantic representation are illustrated in the above paper.

[2] TITLE: Feature detection and matching with OpenCV-Python

AUTHOR: sanjaydev0901

The aforementioned article explains which feature detection algorithm is superior to the others. The ORB is among the most effective, according to the report.

[3] TITLE: Content-based image retrieval: A review of recent trends

AUTHOR: Ibtihaal M. Hameed, Sadiq H. Abdulhussain, Basheera M. Mahmood

This gives a skeleton of CBIR frameworks and low-level features of recent. It also gives a view of machine learning algorithms and similarity measures.

[4] TITLE: Overview of Image Matching Based on ORB Algorithm

AUTHOR: Chuan Luo, Wei Yang, Panling Huang, Jun Zhou

The work mentioned above discusses both the traditional ORB algorithm and updated variants of the ORB algorithm. It contains information on feature points and the performance index.

**EXISTING SYSTEM**: If a user requires a specific cloth and is pressed for time, he or she will go and look for itat several stores, which could take a long period. A user may also choose to do their purchasing online. Only a few apps and websites that offer fabric to customers who shop online. It implies that not all websites with online purchasing applications offer cloth. He or she is unable to examine the product's quality, and it takes two to three days for our order to be delivered. Customers who are in a rush for the fabric in this instance won't be happy. The consumer may or may not be allowed to look for the cloth they require.The user might not be able to locate the precise cloth they require, which would lead to a dissatisfied and unhappy consumer. Merchants of textile stores must locate the fabric requested by customers when they visit the store. The merchant may need more time to locate the fabric if the store has multiple stories and offers a wide variety of fabrics.

Many more systems based on other sorts of algorithms also use image processing techniques. There are numerous web programmes for shopping for various goods, but none are specifically and only for finding fabric from a nearby textile shop.

# IV PROPOSED SYSTEM

This approach would be the greatest option to acquire recommendations and retailers carrying that particular cloth when a user wants one and has limited time.The user can go get something, saving time and completing his work on schedule. The suggested technique will assist users in obtaining the cloth they need and make them satisfied. The user will at least be provided recommendations for the closest-matching patterns if they are unable to obtain their desired cloth. Since they will have information on where fabric is located in their stores, retailers will have an easier time locating fabric.

Techniques for image processing: The ORB feature extraction algorithm for greyscale images and the 3D colour histogram in the HSV colour space image descriptor for colour images are both utilised for feature extraction.When it comes to pattern matching, the Chi-square distribution algorithm for colour images and the KNN algorithm for greyscale images are both employed.This web application integrates image retrieval. The suggested system would be the first exclusively web-based tool for local textile shops to recommend fabrics. Customers can upload needed fabric photographs, start receiving recommendations for needed fabric, go and buy fabric, and save time here. Shopkeepers will register and upload products together with their entire descriptions.

Important libraries:

- flask
- OpenCV-python
- NumPy
- flask-sqlalchemy

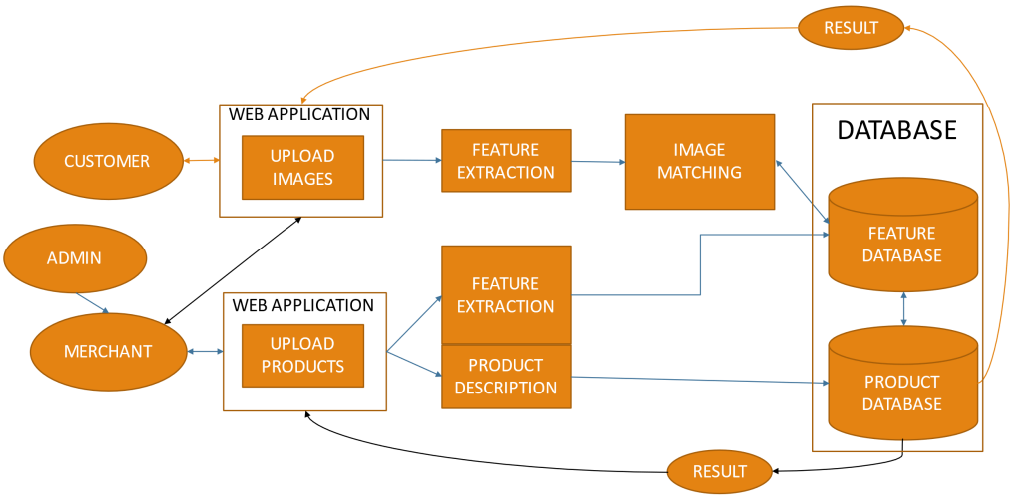
# V IMPLEMENTATION

**FROM THE VIEWPOINT OF THE ADMIN:**The admin is in control of and oversees the entire web application. To access the web application, the admin must register, log in, and log out. Has the power to terminate merchants that abuse the web application.

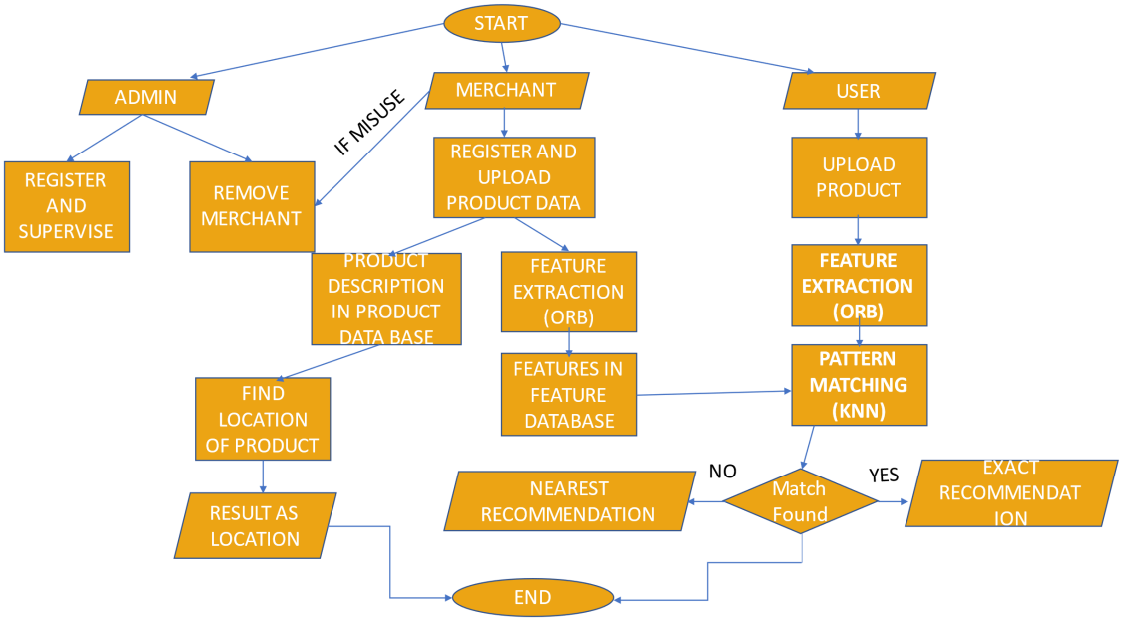
**FROM THE VIEWPOINT OF THE MERCHANT:**In order to create an account, merchants must register with the web application. They upload product descriptions that will be kept in a different database along with photographs of textiles that are offered in their stores. Every time, they must update their product database. Without any additional marketing, this procedure will increase sales. They will also upload location of fabrics at their stores into database which will be used in serving to customer in short time.

**FROM THE VIEWPOINT OF THE CUSTOMER:**Customers submit the fabric image that best fits their needs. Following the use of image processing techniques, the results are based on the availability of the fabric. If the necessary fabric is unavailable, some suggestions will be made. The satisfied clients would then easily go shopping for their fabrics.

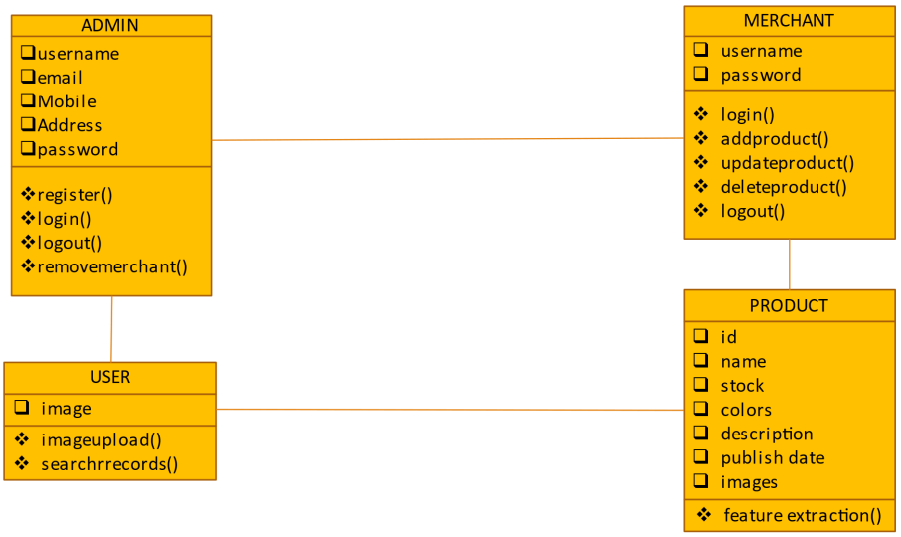
## System Architecture



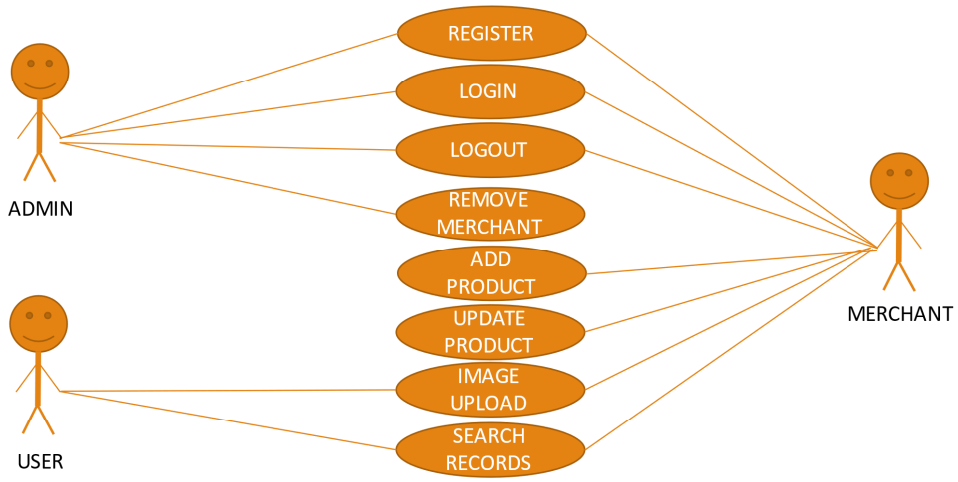

## Data Flow Diagram




## CLASS DIAGRAM




## USE CASE DIAGRAM




**PRODUCT:** Product Description is a list of a product's characteristics that facilitates user search. The product description comprises the item's ID, name, stock level, colours, and fabric type.

## FEATURE EXTRACTION:

## For Color Images:

**A 3D color histogram in the HSV (Hue, Saturation, Value) color space** is a popular image descriptor used for feature extraction in computer vision and image processing applications. The HSV color space represents colors in terms of hue, saturation, and brightness, which

makes it a suitable choice for analysing color images.To create a 3D color histogram in the HSV color space, an image is first converted from the RGB color space to the HSV color space. Then, the image is divided into a grid of small regions, and the color of each pixel in each region is used to populate the corresponding bin in the histogram.The 3D histogram consists of bins for each combination of hue, saturation, and value. The hue axis represents the color's angle on the color wheel, while the saturation axis represents how intense the color is, and the value axis represents the brightness of the color.By analysing the 3D color histogram, we can extract features from the image that represent its color distribution. This information can be used in various applications, such as object recognition, image retrieval, and image segmentation.

**The chi-square distance algorithm** is often used for pattern matching in computer vision and image processing applications. It is a measure of the similarity between two histograms, which can be used to compare the color distribution of two images or regions of interest within an image.The chi-square distance algorithm calculates the difference between the observed and expected frequencies of the values in each bin of the histograms. It then squares these differences and divides them by the expected frequency before summing them up over all bins. The resulting value gives a measure of the distance between the two histograms, with smaller values indicating greater similarity.To use the chi-square distance algorithm for pattern matching, we can calculate the distance between a reference histogram and the histograms of potential matches. The potential match with the smallest chi-square distance is considered the best match.Overall, the chi-square distance algorithm is a useful tool for comparing histograms and can be applied in a variety of applications, including image recognition, object tracking, and image retrieval.

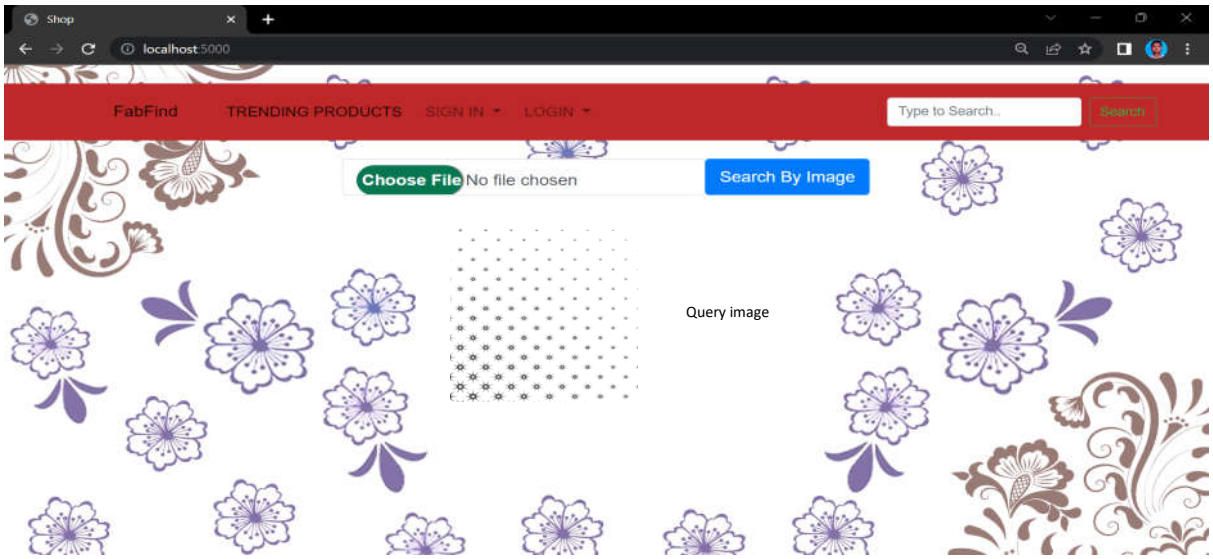
## For Greyscale Images:

**ORB for feature extraction**: A well-liked technique for feature extraction in computer vision and image processing applications is the ORB (Oriented FAST and Rotated BRIEF) algorithm. The FAST (Features from Accelerated Segment Test) corner detection technique and the BRIEF (Binary Robust Independent Elementary Features) descriptor are two essential parts of the ORB algorithm. The key points in an image—areas where there is a noticeable change in intensity—are found using the FAST algorithm. The local features surrounding each key point are then described in terms of binary values using the BRIEF descriptor.The ORB algorithm adds some improvements over FAST and BRIEF in addition to these two approaches.The ORB algorithm is highly suited for real-time applications because of its speed and effectiveness.

**The k-NN (k-Nearest Neighbours) algorithm** is a commonly used machine learning algorithm for pattern matching in computer vision and image processing. It is a simple but powerful algorithm that can be used for both classification and regression tasks.In pattern matching applications, the k-NN algorithm can be used to match an input pattern to one or more reference patterns in a database. The algorithm works by first extracting features from the input pattern and the reference patterns. These features could be, for example, color histograms, texture descriptors, or edge maps.Once the features have been extracted, the k-

NN algorithm searches for the k reference patterns that are closest to the input pattern in feature space. The "closeness" is typically defined using some distance metric, such as Euclidean distance or cosine similarity. The k-NN algorithm then assigns a label or a value to the input pattern based on the labels or values of the k nearest neighbours.The k-NN algorithm can be applied in a wide range of pattern matching applications, including object recognition, face recognition, and image retrieval. One advantage of the k-NN algorithm is that it is simple to implement and requires no training, making it a good choice for applications where the data is constantly changing or where labelled training data is not available.

# RESULTS:





*Uploading query image for searching*


*Image matching Colour description and Chi-square distance*


*Image matching ORB description and*

*KNN-based matching algorithm*


*Merging the above two results.*

# VI CONCLUSION

Customers and retailers would find this suggested web application to be user-friendly. It offers recommendations for nearby fabric shops that carry the fabric a consumer needs, saving the customer time and ensuring their happiness.Additionally, the merchant will benefit from the quick fabric search in his store and boost sales. With regard to both social and economic feasibility, this would be the best choice.

# VII REFERENCES

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