Visual Search Technology For Online Stores

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Abstract- *Large e-commerce companies offer catalogues with thousands of products and plenty of options. Customer's, however are becoming increasingly impatient during the buying process figuring out what they want to buy in the shortest possible time. This hence possess the question of how to make the search process short and seamless and here arises the need of visual search technology. In this paper, we present a novel framework for quality aware content-based image retrieval. On the client side, a query image is compressed and on the server side, different features are extracted and predict the list of results. The experimental results have demonstrated the potential of our work.*

Keywords- Content Based Image Retrieval (CBIR),Feature Vector, Edge Histogram Descriptor, Similarity Check, Colour Extract, Shape extract, Texture Extract.

I. INTRODUCTION

Visual Search Technology is an emerging development technology in the world of Artificial intelligence and Machine Learning which has a potential to revolutionize how customer's find and buy products. Visual search Engine is a search engine designed to search for information on the world wide web through the input of a digital image or a search engine with a visual display of the search results. Visual search technology can be best achieved by content-based image retrieval. Searching for digital images in large database is a big problem which is the image retrieval problem is solved with the help of CBIR [2]. In CBIR system, content denotes the context that refers to colours, shapes and textures without the keyword, we are not able to examine image content.

In this system, we are going to extract the features from both the database as well as query images. In CBIR, each image that is stored in the database has its feature extracted and compared to the features of the query image. In general, CBIR system has undergone two steps. First is feature extraction which is a process to extract the image features based on colour, texture and shape to a distinguishable extent. Second is matching these feature results obtained from first step to yield visually similar results. The CBIR system having the purpose is to allow users to retrieve relevant images from large image repositories or database. In CBIR, an image is usually represented with a set of low-level descriptors and from that a series of similarity or distance calculations are implemented to effectively deal with the different types of queries.

The main contribution of work is that:

1. Collecting the image collection and maintain in a database and train that images by applying the filtering and feature extraction methods which can be briefly explained below.
2. Get the user query image and test the image with the same filtering and feature extraction technique.
3. Store all the observations and normalize the result.
4. Find the distance for every observation and from that observation find the similarity between them.
5. Produce the content-based product image list with respect to the user query image.

II. IDEA BEHIND PROJECT

As we have gone through many problems in our day-to-day life. One day I think that when you want to buy some product on the urgent basis and we don't know where it is available in market or at e-commerce sites. From this, we came up with idea that there should be an online platform where we can upload the image of the product you want and get the result as per the input.

We have done too much research on that and the drawbacks of various platforms has been overcoming by our platform.

Parameters / Platforms	Focused On	Product Focused	Drawbacks
Google Lens	Similar images all over the internet	Not every time	Not specific for product searching
Amazon Lens	Similar products	Every time	Focuses on the texts of products hence outputs low accuracy
Pinterest Lens	Similar images all over posts on Pinterest	Not Every time	Not specific for product searching

Fig-1: Comparison of drawbacks of different platforms

III. LITERATURE SURVEY

Some common techniques pertinent to image retrieval have been discussed while traversing through the literature. Image retrieval systems are classified into two different types. The first approach offers search capabilities of local or global image features such as colour, texture or shape. The other method is the idea of adding keywords to images as an annotation.

The system relies on segmenting image regions by clustering features like colour, texture or shape and differentiating them into foreground and background regions. A semantic visual template for each of the background and foreground regions is used to retrieve images. In order to improve the similarity level at next iteration using the feature weights of most relevant images retrieved in each iteration.

In this project, we work with the Deep FashionDataset [10], which is collected by researchers in the Chinese Hong Kong University. It has over 800,000 various fashion images and rich annotations with additional information about landmarks, categories, pairs etc. The dataset consists of 5 different kinds of predicting subsets that are tailored towards their specific tasks.

CATEGORY	OLD LABEL	NEW LABEL	TOTAL
Blouses Shirts	10	0	3,000
Dresses	13	1	3,000
Hoodies	8	2	3,000
Jackets Vests	2	3	3,000
Rompers Jumpsuits	18	4	3,000
Sweaters	7	5	3,000

Fig-2: Categorization of data from whole dataset

One subset, named as Attribute Prediction, can be used for clothing category and attribute prediction. With close to 290,000 images of clothing attributes, this subset is ideal for our experiment. We changed the old labels of 6 categories and randomly picked 3,000 images from each category to have evenly distributed labels, as shown in table below. After this step, we have 18,000 images in total. A random 1,500 of them are used as validation set and others are used as train set.

IV. DESIGN AND ARCHITECTURE

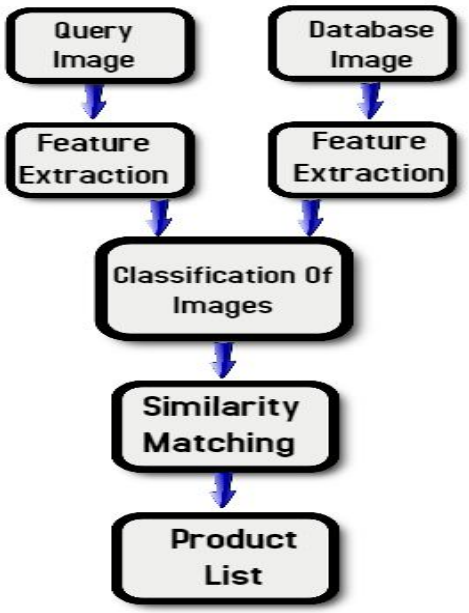


Fig-3: Block Diagram Of VST

In the developed application, the confidential dataset is used to train machine learning model which provides maximum accuracy by using most effective machine learning algorithm. This model was integrated into the application so that it could be used with a front-end interface for accepting query images from user [1].

As the user upload the snapshot or screenshot of the image, he/she will get the cropping option. So that user can crop the image in such a way that result mainly focuses on the main image These query images are then compared with the images stored in the dataset and from that different features can be extracted such as colour, texture and shape.

After extracting all the features from query image, a group of similar features can be made and the most similar image compared to query image is evaluated and finally we get the list of product images from best match to worst match. Feature extraction, classification of images and similarity matching can be done more effectively by various machine learning algorithms within less time span.

An image retrieval is a computer system for browsing, searching and retrieving images from large database of digital images. Image retrieval is a prime topic in the field of pattern recognition and artificial intelligence. There are

different types of image retrieval systems and are discussed below:

1. Colour Based Retrieval:

Several methods for retrieving images on the basis of colour have been described, but most of the methods use the same basic principle. Each image added to the collection is analysed to compute a colour histogram, which shows the proportion of each colour pixels within the image. The colour histogram for each image is then stored in the database. The matching process retrieves images whose colour histograms are similar to the query image [4].

2. Texture Based Retrieval:

In general, matching of texture- based image is carried out with the similarity between the areas of the images with similar texture. Various techniques have been used for measuring texture similarity is by calculating the relative brightness of selected pairs of pixels from each image. From these it is possible to compute some measures for the texture images such as the degree of contrast, coarseness, directionality, regularity or periodicity and randomness. Texture queries can be formulated in a similar manner to colour image queries, by selecting examples of desired textures from a palette or by supplying a query image. The system then retrieves images with these texture measures that are close to the query image [3].

3. Shape Based Retrieval:

The ability to retrieve images based on shape is perhaps the most obvious requirement at the primitive level. Unlike texture, shape is an impartially well defined concept and there is considerable evidence that natural objects are primarily recognized by their shape [5]. Queries are then answered by computing the same set of features for the query image and retrieving those stored images whose features are most closely match to the query [2].

V. IMPLEMENTEDTECHNOLOGIES

1. Machine Learning:

Machine learning is one of the most powerful technologies in the world. The purpose of machine learning is the construction of algorithms that can adapt and learn from their experience [3].Machine learning tasks are simply classified into three broad categories:

A) Supervised learning: - In supervised learning, the system infers a function from labelled training data.

B) Unsupervised learning: - In unsupervised learning, the learning system tries to infer the structure of unlabelled data.

C) Reinforcement learning: - In reinforcement learning, the system interacts with a dynamic environment.

2. Support Vector Machine:

Support Vector Machine (SVM) is used in both classification and regression. In the Support Vector Machines, the data points are represented on the space and are categorized into groups and the points with similar properties fall in the same group.Support Vector Machines implement numerous kernels such as Linear, Radial Basis Function (RBF), Laplace RBF [2], Sigmoid, AnoveRBF [6], Polynomial and Gaussian to deal with non-linearity and higher dimensions [7].

3. K-Nearest Neighbour:

The K-Nearest Neighbours (KNN) is an easy-to-implement and simple supervised machine learning algorithm which can be used for both regression and classification tasks. KNN postulates that similar entities exist in proximity.For every entity, KNN calculates its distance from every other entity, sorts them in ascending order of the distances and classifies the first k elements into the class to which the maximum number of the first k elements belong to [7].

4. K-means Clustering:

K-means Clustering Algorithm is an iterative algorithm that splits data into k predefined, distinctive, clusters (groups), where each observation in the data belongs to only one group. To split the data into k clusters, centroids are selected at random from the entire dataset [9].

After the centroids have been finalized, the square distance between the remaining data points and the centroids is calculated and the data points are assigned to clusters whose centroid is at a minimum distance from them. Multiple iterations can be added to this process to ensure that the data points are always assigned to the accurate and same clusters.

VI. RESULT AND EVALUATION

This section provides quantitative evaluations of different methods on the three benchmarks. We also investigatemultiple building blocks of the proposed

FashionNet summarizes the performance of different methods on category classification and attribute prediction.

First, we performed a control test and see that randomly selecting pairs from the subset gives us 10.8% accuracy (this is due to the highly imbalanced nature of the category distribution). The off-the-shelf VGG-16 network already beat that benchmark, but the retrained networks gave us an even greater boost in performance, with the network trained on the full set of categories giving us up to 80% accuracy in matching items on this subset.

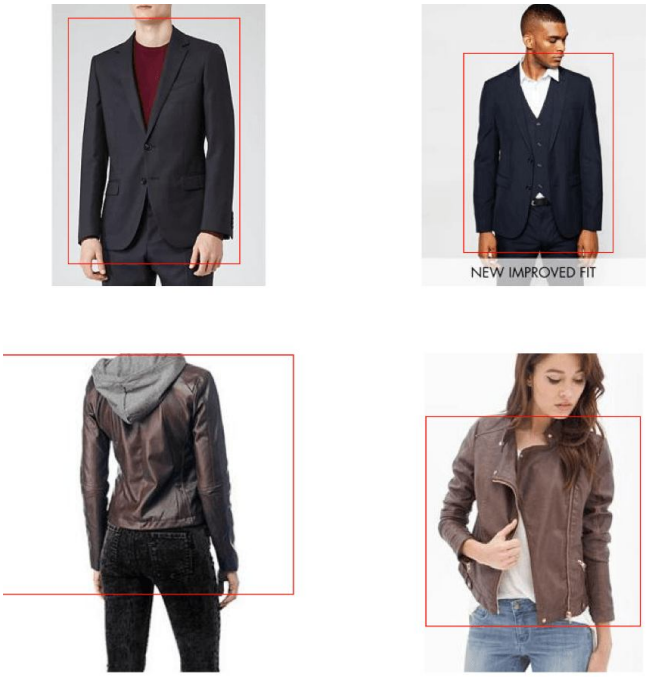
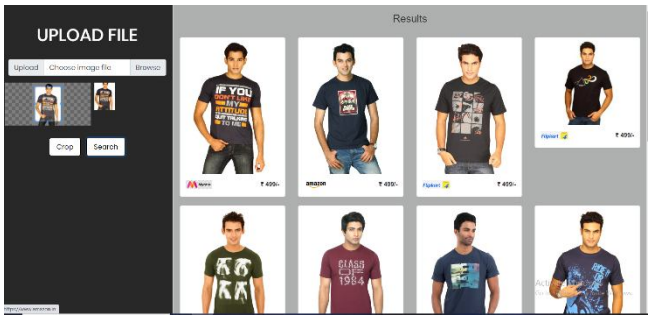


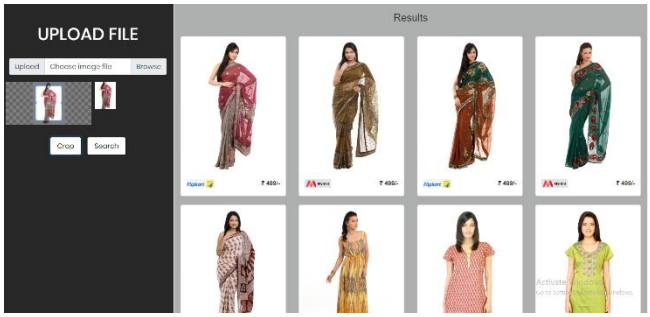
Fig-4: Similarity matching results

The results product list displayed on our platform are shown below which predicts the result on the basis of query image uploaded by user with the use of various machine learning algorithms in a very effective manner. Various test cases of result have shown below:

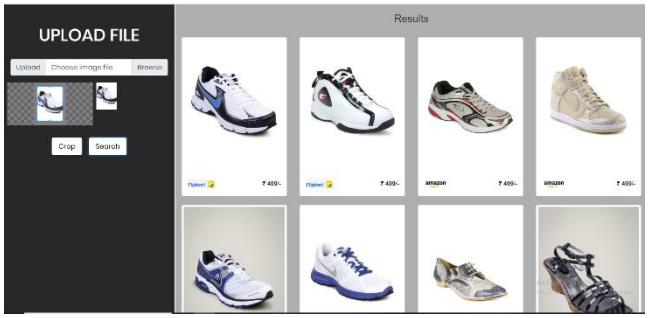
Test Case 1:



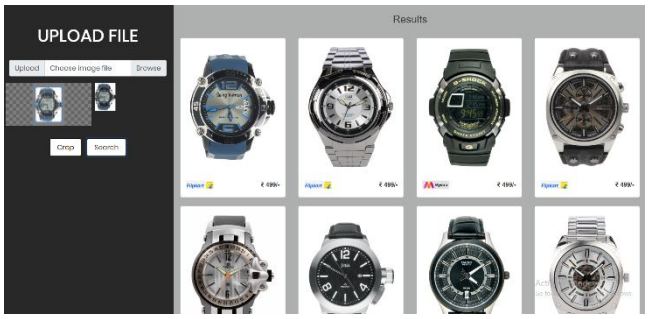
Test Case 2:



Test Case 3:



Test Case 4:



In this way, our platform displayed the products list as per the user requirement and after clicking on the product image it is redirected towards perspective website and from that you can buy or add to cart of that website.

VII. CONCLUSION

Visual search technologies became the new era in the development of the ecommerce industry providing online buyers and merchants with an absolutely new shopping experience. As we can see, the scope of these technologies is large, and this domain is expected to further evolve in the future. CBIR is the process of extraction of the images from the dataset on the basis of relevance of the contents. On the basis of content, relevant images have been retrieved from huge dataset. Various techniques have been used that are

implemented for retrieval of the images from the dataset based on query images. Texture, colour and shape-based features have been used in the process of feature extraction from the images. In this paper various approaches have been discussed that has been used for feature extraction based on CBIR process. On the basis of these approaches effective features have been retrieved from the dataset images so that maximum relevant images can be easily extracted from the dataset.

VIII. ACKNOWLEDGMENT

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