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Pick through Pic Price Comparison Website using Object Recognition

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Abstract

The proposed system is aimed at viewing different online product's price through object recognition. The system provides list of price of a product by comparing with other websites. Unidentified products can be easily recognised by object recognition just by uploading the picture. Web sites which provide the best price for a product are abundant in internet nowadays. These sites gives the best price by searching the name of the product provided by the user in a search bar. However it would be interesting, if the web application could find best price using the image of the product as input. The proposed web application does the same, enabling the user to upload the image of the product and provide the best price while avoiding unnecessary advertisements and information. Thus the over burden of typing out the exact name of the product is thus reduced. Object recognition is used to identify product. To obtain the information regarding the product, the API's of different E-commerce sites are taken.
Keyword- Object Recognition

I. INTRODUCTION

E-commerce is fast growing market. In 2017 the global e-commerce retail sales is recorded as 2.304 billion USD, the expected sales in 2018 is 2.842 billion USD and 3.453 billion USD in 2019 according to [1] say. Online retailers are competing with each other to increase their sale. They need to stay low with the price of other online retailers for that they need to monitor other data and change their own price manually. For this use of Software Tools will be useful to automatically detect the price drops and get price change suggestions. Day by day one after the other, new online retailers comes with new trends. If there is some website which finds the best price for online shoppers it will be useful for them to know the price drops. So rather than wasting time on e-commerce sites to do research on least price of a product the online shopper can easily find the cheapest price in which the product is available.

The proposed object recognition enabled price comparison web-application in its initial form will be known as 'PICKTHRUPIC v1.0'. The intended audience will include those who are more dependent and aware of purchasing products from E-commerce sites. The web application will ease their effort of finding a product at a good price. The main functionality involves providing the user, the best online price of the product from an input image of the product. This web application will thus enable a lot of users to look for a good price by taking its picture which may not be in their possession. The web application will also serve as an advertising agent for E-commerce sites as well.

II. LITERATURE SURVEY

A. Price-Comparison Agents for Magics [2]

Mobile agents are well suited for facilitating consumer buying process on the Internet, particularly for comparing prices. In this paper, they presented a Mobile Agent-based Internet Commerce System (MAGICS) and discuss how it can be used to facilitate price comparison. Markov decision theory is used to formulate a mathematical model to determine the optimum number of mobile agents to be dispatched if the price distribution is known. The mathematical model is solved with both the uniform price distribution and the normal price distribution using backward induction algorithm. The results are useful for designing price comparison services in general and MAGICS in particular.

B. Mining E-Commerce Data from E-Shop Websites [3]

This paper contributes a novel approach for the automated identification and extraction of product price data from arbitrary e-shop websites which is independent from thee-shops' language and the product domain.

C. Web Content Extraction Using Contextual Rules [4]

In this paper, a wrapping language supported by a visual tool is used to create wrappers for extracting the main content from web pages. The language is designed to be easy to use, and expressive enough to cover most common scenarios. In this language, various types of features (syntactical, semantic, visual, and densitometric) can be employed in the extraction rules to identify the

content of interest. Moreover, contextual information can be utilized as context variables to restrict the application of each rule to certain parts of the page and refining their content. Furthermore, the rules can be organized hierarchically to share common rules among wrappers for similar websites. The system is particularly suitable for extracting the main content from blogs, news and encyclopedia websites.

D. The Content Extraction Method of Webpage Information based on Knowledge base [5]

Web content extraction involves transforming web unstructured information into structured information. Knowledge base has the advantages of ordering information and knowledge, also be used conveniently. So it's convenient to retrieve information and knowledge, and it makes base for effective use. Knowledge base will speed up the knowledge and the flow of information and make for knowledge sharing and communication. This paper puts forward a web information extraction method which is based on the knowledge base. Experiment results show that the method has greatly increased efficiency and accuracy of the web information extraction.

E. Similar Image Retrieval in E-Commerce for Online Shopping based on color and edge [6]

It is based on similar image retrieval in e-commerce for online shopping based on color and edge; aiming at efficient retrieval of images from the large database for online shopping. Here, RGB (horizontal and vertical) projection is used for creating our application with a huge image database, which compares image source with the destination components.

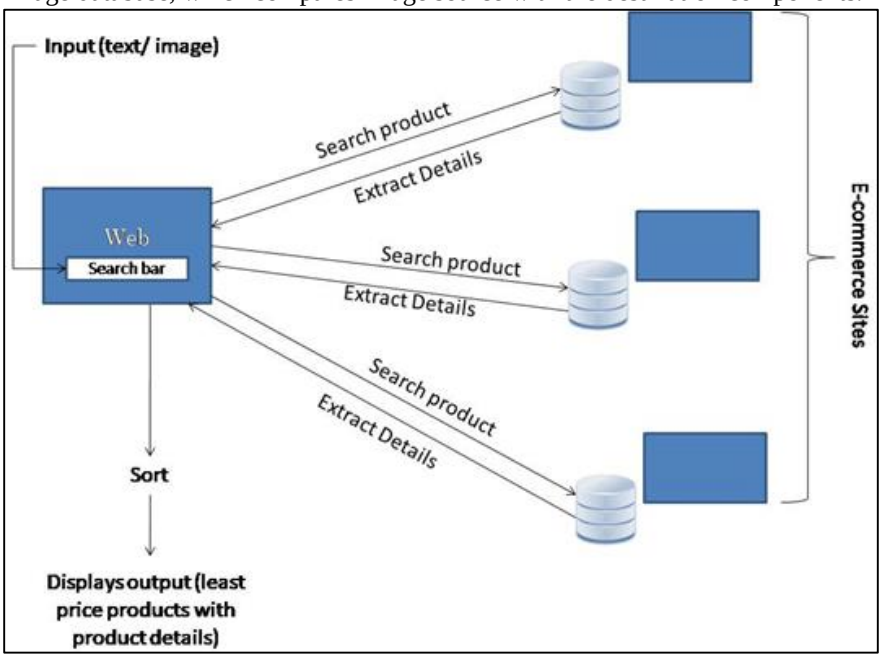

Fig. 1: Architecture of proposed system

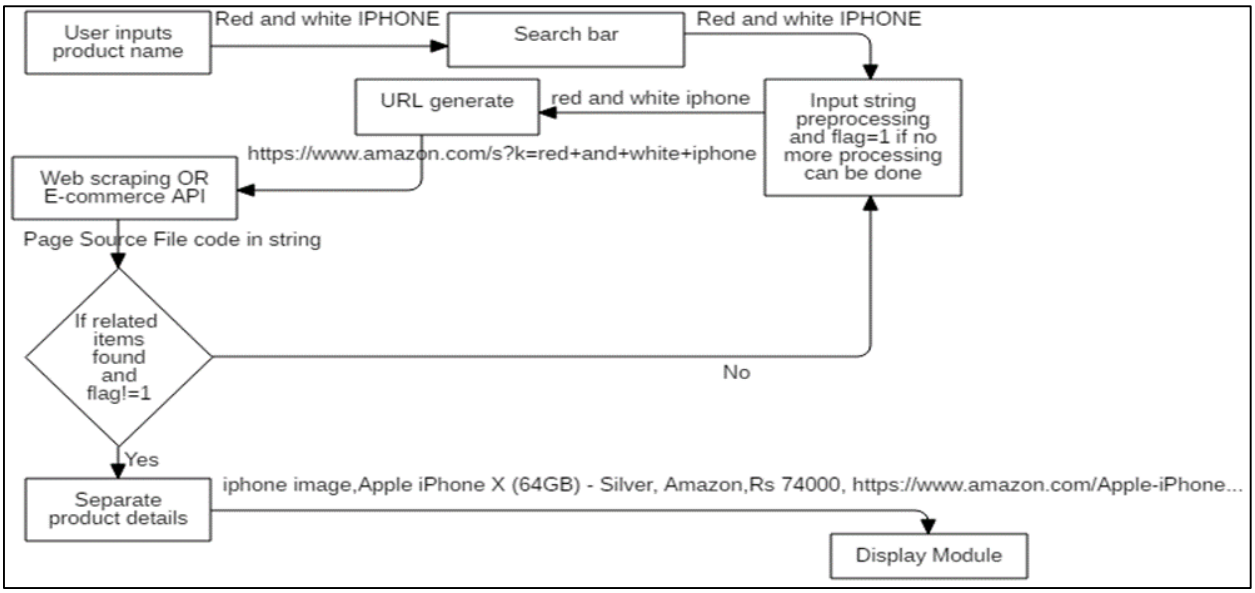

Fig. 2: Block diagram for search by text

III. OVERVIEW OF PROPOSED SYSTEM

To design a web application that helps users to obtain the best price for a product by uploading its image, without the overhead of typing out the exact name of the product.

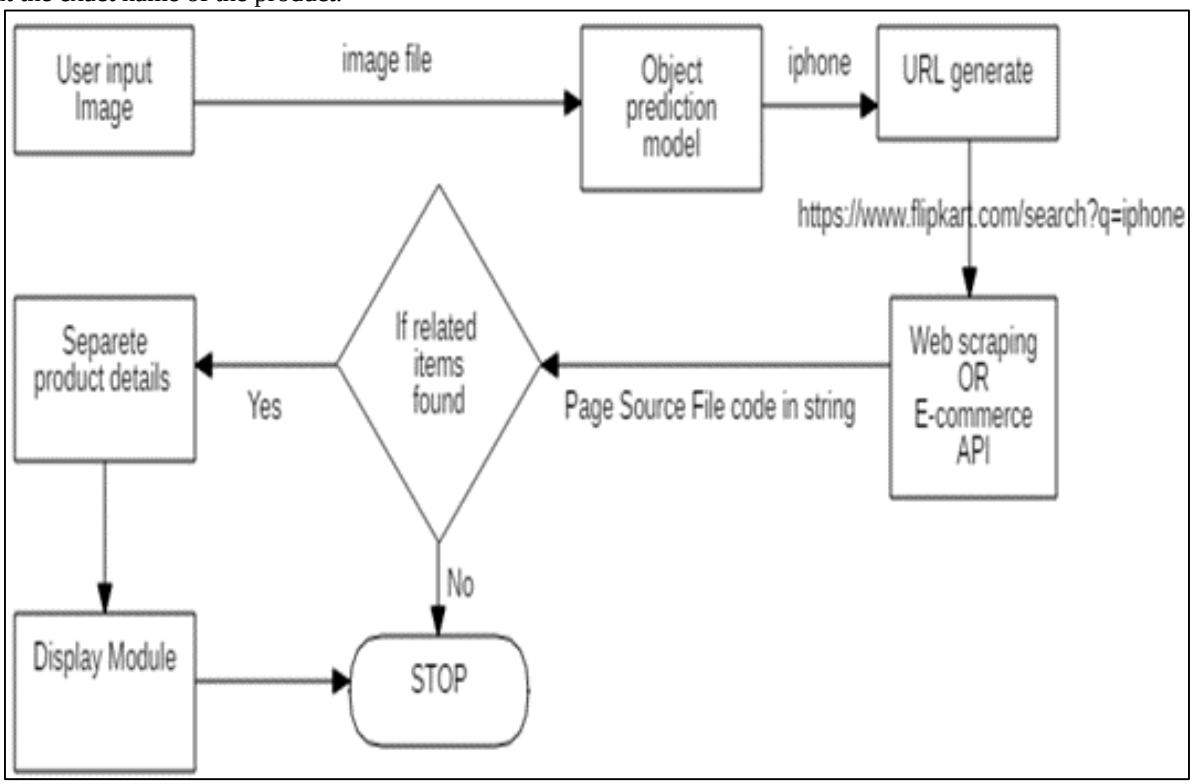

Fig. 3: Block diagram for search by image

IV. ARCHITECTURE OF PROPOSED SYSTEM

The proposed system consists of three modules:

- Search by Text
- Search by Image
- Display

A. Search by Text

This module essentially contains a search bar, in which the user can type the name of the product, whose least price is to be known. This is useful, when the user is not in possession of the product image. The search bar is implemented using an html form of type 'text' and the back-end search is done using PHP. The input of the user in search bar is taken in string format. Then the string is used to create URL of e-commerce sites which undergo web scraping. The space in between the words of string is replaced with '+' and then this is appended with e-commerce site web address to create URL for web scraping. Web scraping means to get the view page source code of corresponding page using URL. This page source code extracted as string will contain all the details of all related products of product name specified in URL. The necessary information from the string data is separated and send to display module. That is product name, product image, product price, product buy HTML link and seller name is separated from the page source code string and store the information together for display.

B. Search by Image

This is useful, when the user has the product image. The user can upload the image by browsing from the local file system upon clicking a button. The image is uploaded to the object recognition model, which is trained using SqueezeNet algorithm. The output of the recognition model is name of the object in uploaded image in string format. CNN are ideally used for images and videos processing. CNN takes a fixed size input and generate fixed size output. RNN are ideally used for text and speech analysis. The training and prediction algorithm SqueezeNet uses a CNN, which extracts the features from the input image. SqueezeNet is modified AlexNet with accuracy with 50x fewer parameters and <0.5Mb model size. Basically SqueezeNet is used to train on large dataset and get high accuracy than other existing CNN model types. SqueezeNet uses fire modules consisting of a 'squeeze' layer with 1x1 filters feeding an expand layer with 1x1 and 3x3 filters. It can compress to 510x smaller than AlexNet (0.5Mb). AlexNet level accuracy on ImageNet with 50x fewer parameters.

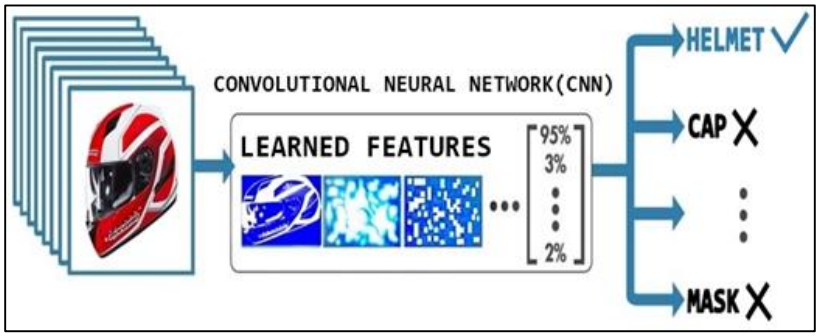

Fig. 4: Convolutional Neural Network

C. Display

The display module displays the appropriate results to the user. The display module can receive data from either type and search module or image recognition module. Once all the data received from other modules the data with same product name is clubbed together and display one of the product image in that section with product label and corresponding seller names with price and product buy link. Similarly all the related product will be listed in this manner. Only limited results are displayed to the user. To find the best price all the price from different e-commerce sites of a product are compared and displayed best price with product link to the user at the bottom.

Display module sorts the result obtained from the ecommerce site and display in tabular form product wise. User will be directed to e-commerce site on clicking the buy link corresponding to the seller name. The matching product image, name etc is scraped from the ecommerce site and is displayed to the user, within a container. The least price is highlighted to the user by after sorting, saving the time of users to search for the best option.

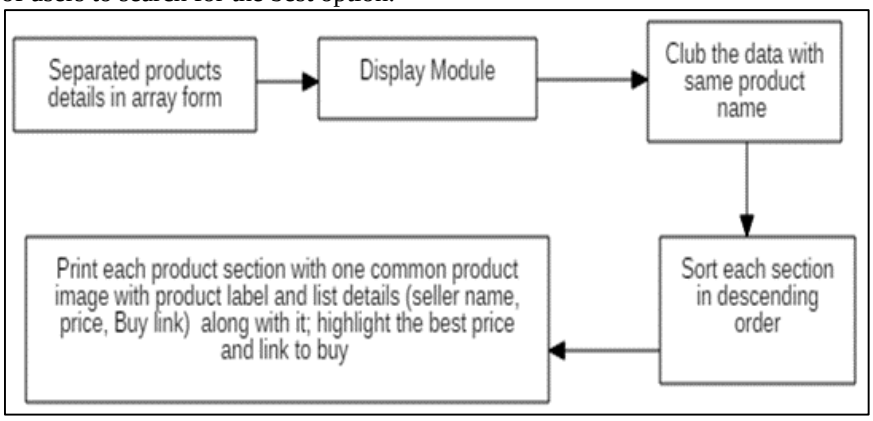

Fig. 5: Block diagram of display module

V. DETAILED DESIGN

A. Web Scraping

Web scraping from e-commerce sites is done to collect the product details. This technique can be done only to the sites which allow web scraping or else they block us from accessing their website without authorisation. Web scraping technique is same in concept but it varies with the source file of e-commerce site. To do this using the product name identified (through object recognition) or given by user, the URL is created to search on the e-commerce site. Then source file of URL is collected and processed to get necessary details of the product. To process this string to get necessary details, first the pattern of the page source file is identified. That the HTML tags along with the product details like product name, seller name, price etc will have an ID along with it. This ID will be same for all product in the page. So there will an ID for product name different ID for seller name similarly different ID for each product details. So using this ID the information location is identified in page source and gets the nearby string to the ID. Thus we can get all the product details. So this separation of product details will be done to all the product resulted in page source string. The details separated from the source file are list of product in search result with corresponding product name, seller name, product price and link to buy the product.

B. E-commerce site API

Application programming interface allows communication by which different applications easily and seamlessly share data between them. Here the e-commerce API helps to extract product information (images,prices) from the shopping site. The prices and images of the product in the ecommerce site will thus be reflected in the web application.

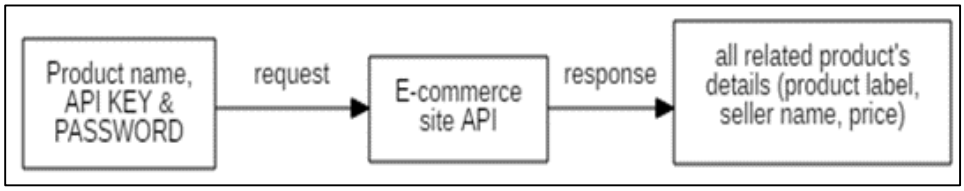

Fig. 6: Block diagram for using E-commerce site API

An API key and password issued by the ecommerce site allows affiliated users to access the corresponding API of the website to obtain information of various products.

C. Object Recognition using Recognition Model

The recognition model is trained with sample images using the SqueezeNet neural network, which is implemented in python using library modules:imageAi,tensorflow etc. This neural network was chosen since it has the accuracy of AlexNet with 50x fewer parameters and <0.5MB model size.This is achieved by using "squeeze" layers, which are convolution layers that are made up of only 1x1 filters and "expand" layers with a mix of 1x1 and 3x3 filters. By reducing the number of filters in the "squeeze" layer feeding into the "expand" layer, connections entering these 3x3 filters are reduced, thus reducing the total number of parameters. The string produced as a result of successful recognition by the model, can be used in the search query of the ecommerce site for web scraping the details of the desired product.

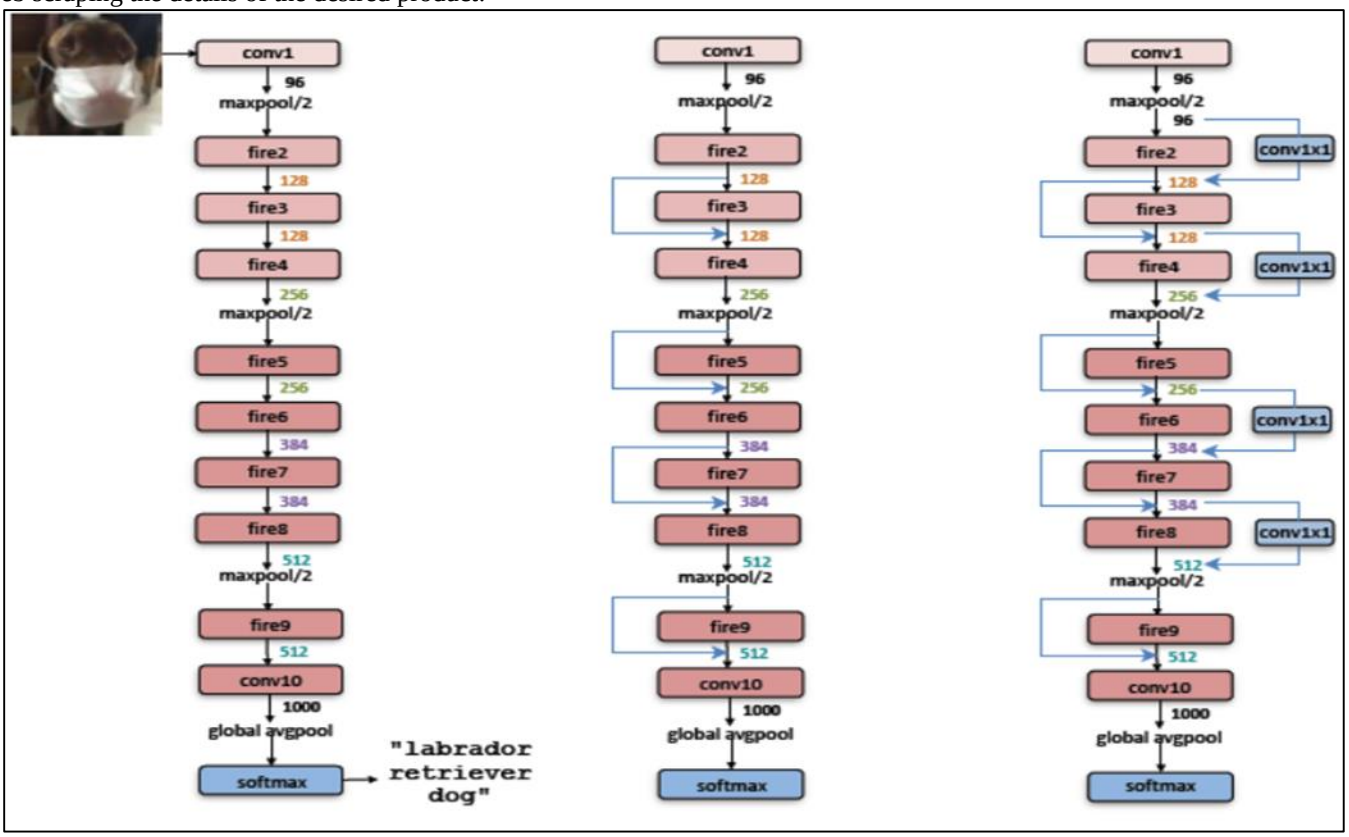

Fig. 7: Macro architectural view of SqueezeNet architecture. Left: SqueezeNet; Middle: SqueezeNet with simple bypass; Right: SqueezeNet with complex bypass

VI. EXPERIMENTAL RESULTS AND ANALYSIS

The website was tested on the basis of output time delay for different types of images. Various image file and formats were given as the input images. The experiment demonstrated that, latency of detection for different images differed from each other.

Image Formats	*Compatible*	*Time Delay (seconds)*	*Accuracy (%)*
Black And White	*Yes*	*18.50*	*100*
Grayscale	*Yes*	*13*	*100*

RGB	*Yes*	*14*	*100*

Table 1: Object recognition accuracy comparison basis of Image Format

Image File Type	*Compatible*	*Time Delay (seconds)*	*Accuracy (%)*
Tagged Image (.tiff)	*Yes*	*14*	*100*
JPEG(or JPG)- Joint Photographic Experts Group (.jpeg)	*Yes*	*14.70*	*100*
GIF - Graphics Interchange Format.(.gif)	*Yes*	*18.50*	*100*
Portable Network Graphics.(.png)	*Yes*	*18*	*100*

Table 2: Object recognition accuracy comparison basis of Image File Type

Most of the image formats are compatible and each product shows 100% accuracy also.
Tested in Dell Laptop,
System Model: Inspiron 3521
OS: Windows 10 Pro. 64-bit (10.0, Build 17134)
Graphics: Intel(R) HD Graphics
Ram: 6144MB
Python Version: 3.7
Local host server: XAMPP v3.2.2

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