Data Retrieval and Analysis to Identify the Associated People of Instagram using Image Processing

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Abstract*: In the past three years, Instagram has had the fastest growth of any social network. Users may post photographs with a description, a location, and a few hashtags that did not always correspond to the content of the images to express their status. As a result, Instagram is currently the most widely used photo-sharing platform. Even though Instagram is a rather straightforward service, its ease of use has helped it become so popular all around the world. But regrettably, some individuals abuse our website for immoral activities including the dissemination of false information and fake news, support for terrorism, immoral religious practices, the sale of illegal drugs, etc.So, According to the results of the Literature review we can use the technologies such as Demographic analysis, Text analysis, Image analysis, Snowball Technology and some of the face recognition technologies used in iPhone photos , face recognition technologies such as Eigenfaces technology, Neural Networks, Graph Matching, Line Edge Mapping as the Data Retrieving and Image Processing technologies. So this paper discuss about the implementation of a system to retrieve and analyze image data from Instagram and to identify the most associated people of a certain Instagram user.*

Keywords: *Instagram, Social network, Face Recognition, Neural Networks, retrieve and analyze image data, Demographic analysis*

1. Introduction

Social media has grown to be a hugely significant element of our lives in the modern world. Everyone now relies on social media platforms like Twitter, Facebook, Instagram, and WhatsApp. People share hundreds of photographs, posts, and comments on their accounts when it concerns to Instagram. However, there are situations when these images, posts, or comments have an impact on a national security. This indicates that some individuals misuse Instagram for some illegal behavior, like the distribution of false information and fake news, support for terrorism, illegal religious practices, the sale of illegal drugs, etc. Unfortunately, some of these illicit actions also contribute toward some of the crimes, murders, and suicides.

Particularly with regard to Sri Lanka, these sorts of illicit activities are becoming more prevalent every day. Therefore, it is essential to build a system to retrieve data from Instagram accounts and analyze that data to determine the mostly associated people of a certain Instagram account.

Nowadays, since some people use Instagram for unlawful activities including spreading false information and fake news, supporting terrorism, engaging in immoral religious practices, selling illegal drugs, etc., it frequently has an impact on murders, crimes, or suicides as well. We may thus create a new system that analyzes data from a specific user's Instagram account and predicts the users who are most likely to be affiliated with that Instagram account in order to solve problems of this nature. This system's primary focus is on creating an algorithm with image processing to identify the faces in the retrieved photos and forecast the percentages of the individuals who are most often related. Finally, this method will show the facial image of the most associated person of a certain Instagram users.

When concerning this system it consists with two parts.The first part is the Data Retrieving process and the second part is Image classification and image processing. So, this paper is going to discuss about the implementation of a system to retrieve and analyze image data from Instagram and to identify the most associated people of a certain Instagram user.

2. Literature Review

This section provides an overview of the literature on a number of current data retrieval and analysis technologies and approaches, including the Snowballing method, Binary coding, Regression analysis, Text analysis, and Image analysis. Along with Eigenfaces, Neural Networks, Graph Matching, Line Edge Mapping, and the face recognition algorithms used in iPhone photos.

A. Data Retrieving and Data Analyzing

There have been several studies conducted to extract various types of data from Instagram, evaluate them, and identify the essential information of a particular Instagram image.

Instagram may be used for demographic analysis, language analysis, picture analysis, and age identification, claims a research by Pang et al.(Singh, Halgamuge and Mouss, 2019; Hyanghee Park and Joonhwan Lee, 2017). With the use of several face identification and face analysis

technologies, the photos used in this work were used to examine the demographic. We looked at the tags that match to the photographs. Studying the brand's supporters and drinking habits has helped to increase penetration.

Then, according to study by Park et al.(Singh, Halgamuge and Mouss, 2019), it may be done with Instagram using the Snowballing approach, Binary coding principles, and Regression analysis. (Hyanghee Park and Joonhwan Lee, 2017) A quantitative approach is used to examine the relationship between sexual images and social participation. Additionally, the quantity of likes was used. The snowballing strategy was developed to collect visual information from people. Through the use of binary coding, the images were self-coded. Regression analysis was used to assess user behavior.

A logistic regression classifier using a forward feature selection strategy may be used for Instagram, according to study by Hosseinmardi et al. (Hosseinmardi *et al.*, 2016; Singh, Halgamuge and Mouss, 2019).The initial posts are used to gather information. Using LRC, a predictor was learned. To evaluate the behavior, Instagram comments, photographs, and followers were used. Bigrams and unigrams were highlighted.

It is an Instagram profile verifier while taking into account the research INSTAFIER.(Aggarwal, Upadhyaya and Aggrawal, 2019) By providing pie charts for each component test, the authors of this study analyze an Instagram profile and give a thorough analysis of the account. Therefore, it is simpler to understand the account when using these pie charts.

B. Face Recognition Technologies a) Face Recognition Technologies use in iPhone Photos

The majority of iPhone images utilize face recognition and image similarity checking processes. Face detection was first developed by Apple and is now available as a public API through the CIDetector class in the Core Image framework. Additionally, Apple used this API internally in programs like Photos. The original iteration of CIDetector used the Viola-Jones detection method. (Viola and Jones, 2001). Deep convolutional networks (DCN) were only beginning to show promise on tasks that required object recognition when the development of a deep learning approach to recognize faces in pictures began in 2014. The most important of these was a technique called "Overeat" (F, F. and G, 2013), which made numerous straightforward ideas well-known and showed that DCNs were incredibly effective in searching an image for an object. Network-innetwork technology is another one that is used (Turk and Pentland, 1991). It would be completely impossible to use such a network using the previously suggested photo scanning technology. Low efficiency and high energy use were the results. Even trying to store the network in memory would be impossible. With it, they attempted to use the "teacher-student" training method (Patil and Deore, 2013). This technique gave them a mechanism to train a second thin-and-deep network (the "student") so that its outputs nearly resembled those of the vast, complex network we had previously trained (the "teacher"). Finally, they created a deep neural network face identification method that could be used on a mobile device. To build a network model accurate enough to handle the targeted applications, they went through multiple training cycles. Even though this network was accurate and workable, it took a lot of effort to have it installed on millions of consumer devices (Sung and Poggio, 1995).

b) Eigenfaces

Another technology that has been the subject of substantial research for facial identification is eigenface. The Karhunen-Loève expansion, eigen image, eigenvector, and major component are further names for it. In the references (Bruce, Hancock and Burton, 1998; F, F. and G, 2013) principal component analysis was used to depict images of people's faces. They argued that by employing a basic set of weights for each face and a representative image of the face, or the eigenpicture, each face image could be roughly reconstructed. The weights defining each face are obtained by putting the face image on the eigenpicture. Kirby and Sirovich's approach was the source of inspiration for Reference (Turk and Pentland, 1991), which used eigenfaces for face detection and identification. They stated that a face image could be roughly reconstructed by utilizing a standard face shot and a small set of weights for each face. The weights defining each face are obtained by projecting the face image onto the Eigen image.

c) Neural Networks

The usefulness of using neural networks may be connected to their nonlinearity. The feature extraction stage may therefore proceed more quickly than the linear KarhunenLoève techniques. One of the first artificial neural network systems for face identification was WISARD, a network with only one layer of adaptation and a separate network for each stored person (Patil and Deore, 2013). For accurate recognition, the technique utilized to construct the neural network structure is essential. It greatly depends on the intended usage. Multilayer perceptron (Sung and Poggio, 1995) and convolutional neural network (Lawrence *et al.*, 1997) have both been used to recognize faces. In reference (Lawrence *et al.*, 1997), a hybrid neural network was presented that combines local image sampling, a selforganizing map (SOM) neural network, and a convolutional neural network. The SOM reduces the dimension and makes the picture sample insensitive to small changes by quantizing the image samples into a

spatial region where the input data that are near in the original space are similarly close in the output domain. The convolutional network collects successively larger features and provides partial invariance to translation, rotation, scaling, and deformation in a hierarchical succession of layers.

In the PDNN (F, F. and G, 2013) learning scheme, there are two sections. Each subdomain is taught at the initial step using its own set of facial photos. In the second step, referred to as learning based on decisions, particular sample data that was gathered from various classes of faces may be used to learn the subdomain parameters. Not all training examples are used in the decision-based learning technique. We only use patterns that have been misclassified. Any sample that is improperly assigned to the wrong subdomain will cause that subdomain to change its settings. As a result, its judgment is closer to the sample that was mistakenly categorized.

A PDBNN-based biometric identification system combines the advantages of statistical methods with neural networks, and its shared computing concept is straightforward to implement on a parallel computer. According to (ShangHung Lin, Sun-Yuan Kung, and Long-Ji Lin, 1997), the PDBNN face recognition system could identify up to 200 people and achieve a 96 percent accuracy rate in around a second. However, if more individuals are added to the population, the cost of computing will increase. In general, as the number of classes increases, neural network algorithms encounter problems. However, they are inadequate for a single model image recognition test since taking several pictures of each model is necessary to train the algorithms to "optimal" parameter values.

d) Graph Matching

Graph matching is another technique for identifying faces. In order to identify deformation-resistant objects, (Lades *et al.*, 1993) presented a dynamic network structure that uses graph matching to find the closest recorded graph. An alternative to conventional artificial neural networks is referred to as dynamically networked architecture. Memorized objects are represented as sparse graphs with edges labeled with geometrical distance vectors and vertices labeled with multiresolution descriptions expressed in terms of a local power spectrum. Object recognition may be described as graph matching, which is carried out by stochastically minimizing a matching cost function. They claimed successful results using a database of 87 individuals and a small group of office supplies made up of different phrases rotated by 15 degrees.

The matching process is computationally demanding and takes around 25 seconds on a parallel computer with 23 transputers to compare with 87 stored items. Reference(F, F. and G, 2013), which compared human faces to a gallery of 112 neutral frontal view faces, extended on the strategy. The probe photographs were deformed as a result of the face expressions changing and the depth rotation. On faces with sizable rotation angles, positive outcomes were discovered. For matching tests of 111 faces rotated 15 degrees and 110 faces rotated 30 degrees to a gallery of 112 neutral frontal pictures, respectively, they reported identification rates with the percentage of 86.5 and 66.4. Dynamic link design surpasses traditional face recognition systems in terms of rotation invariance, but the matching process is computationally expensive.

e) Line Edge Map (LEM)

An effective object representational aspect that is mostly unaffected by changes in light is edge detail.

With the exception of recent work given in (F, F. and G, 2013), the edge map has mostly been disregarded in face recognition while being widely used in many pattern recognition domains.
The precision of object edge pictures is comparable to that of grayscale photos, making them useful for object recognition. In reference (F, F. and G, 2013), edge maps were utilized to evaluate how similar facial images were. The accuracy percentage was 92%. Takács argued that the process of face recognition may start much younger and that edge images may be used to distinguish faces even when high-level cognitive capacities are not involved. (Yongsheng Gao and Leung, 2002) suggests a method for extracting lines as features from a face edge map called Line Edge Mapping. This approach may be viewed as a cross between template matching and geometrical feature matching. The LEM methodology not only has the advantages of feature-based techniques, like invariance to illumination and low memory consumption, but it also performs exceptionally well in template matching recognition.

By dividing the pixels in the face edge map into line segments, the Line Edge Mapping technique integrates the structural and spatial information from a face image. A polygonal line fitting approach is used to produce the LEM of a face after limiting the edge map [15]. An example of a human front face Line Edge Mapping is shown in Figure 1. The LEM representation needs less data since it just saves the termination locations of line segments on curves. Additionally, LEM is expected to be less sensitive to fluctuations in light as it is a middle-level image representation technique built from a bottom-level edge mapping representation. The basic building block of LEM, which is composed of pixels from the edge map, is the line segment.

For usage as a preprocess of Line Edge Map matching before facial recognition software matches faces, a face prefiling method is given. The prefilering approach may speed up the search by reducing the number of applications, while the actual face matching is only done on a portion of the remaining models.

The recommended Line Edge Map often beats the edge map in tests on front views of the faces conducted under controlled or ideal conditions. LEM correctly recognizes between 96.43 and 100 percent of the input front views of the faces in face databases (Yongsheng Gao and Leung, 2002). For faces with optimal settings, Line Edge Map performed comparably to the Eigenface method, and much better than the Eigenface method for faces with modest variations in appearance.

(Yongsheng Gao and Leung, 2002) illustrates that for face detection under different lighting situations, the LEM technique performs better than the eigenface approach. Similar to the eigenface approach, the LEM technique is less sensitive to changes in posture, but it is more sensitive to significant changes in facial emotions.

Figure 1 Line Edge Mapping Illustration

Table 1 Comparison on Face Recognition Technologies

Technology	Advantages	Disadvantage
Eigenfaces	• Simplicity is high. • Effective • Save time and space	• Sensitive to lighting conditions and head position.
Neural Networks	• Accuracy is high. • Feature extraction is more efficient. • Classification time is very low.	• Much storage is needed.
Graph Matching	• if any of the features change or are missing, the people will still be identified	• Sensitive to lighting conditions
Line Edge Map	• Insensitive for the lighting conditions. • Cheap memory requirement.	• Computing requirement and the specifications are high.

Therefore, Neural Networks will be the best face recognition technology for this system based on the analysis of the benefits and drawbacks of the face recognition technologies discussed above.

3. Proposed System and Methodology

The proposed solution is consist with two main parts.They are;

Image Retrieving and Scrapping Process 2.Face Recognition and Face Similarity checking process.

A. Image Retrieving and Scrapping Process

The practice of deploying bots to gather information and material from a website is known as web scraping.Web scraping collects the underlying HTML code and, with it, data kept in a database, in contrast to screen scraping, which just scrapes pixels seen onscreen. After that, the scraper can duplicate a whole website's content elsewhere.Many digital firms that rely on data gathering utilize web scraping.

When concerning the Instagram Image Retrieving and Image Scrapping process we can use different type of web scrapers.They are;

- Selenium
- Playwright
- Beautyful Soup
- Mechanical Soup

So among the above mentioned web scrapers the best web scraper for the processed solution is Selenium web scraper. By using this Selenium web scraper the system can scrape all the images of a certain Instagram user to a database or a local space.

B. Face Recognition and Face Similarity Checking Process

When concerning this face recognition and face similarity checking process, mainly it focusses on image classification process.

In this proposed system, first we scrape all the images of a certain Instagram user and then start to find who are the associative of a certain Instagram user.So, after scrapping all the images of a certain Instagram user, the system will classify all the Positive and Negative images from those

scrapped images. In here positive images means images with human and negative images means images without out human.As the system needs only the Positive images, it will classify all the positive images.

After classifying all the positive images, the system will take an input facial image of the person that we need to find who are the associatives of that person.

After taking the input facial image, the system will again classify those scraped images to identify whether the input's given person is available or not available in those images.In this stage as the system only needs the images with the person is available, so that it will classify all the images that the input's given person is available.

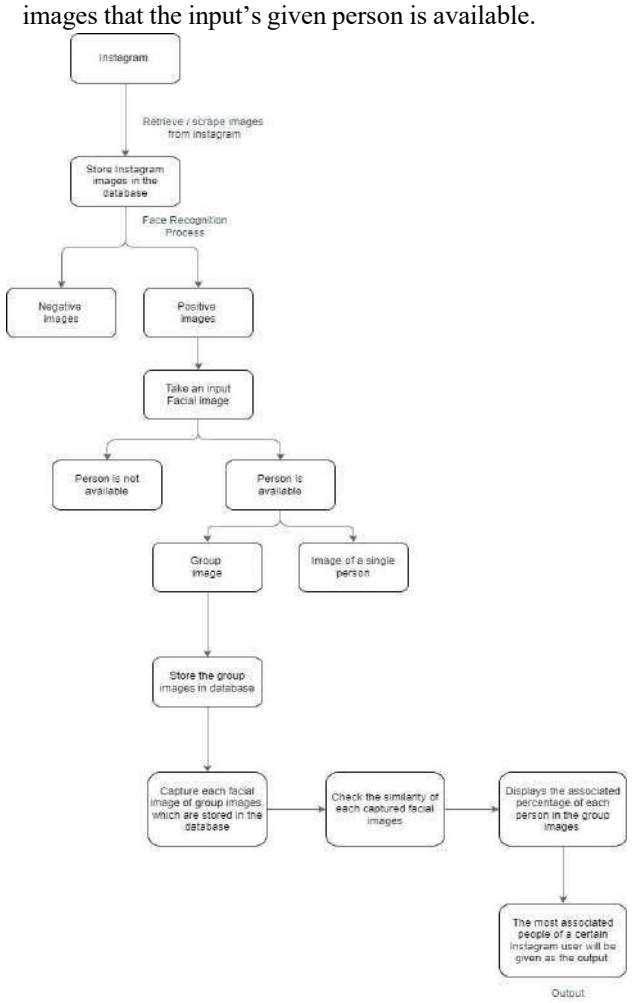

Figure 2 Overall Proposed System

So with reference to Figure 2, if the input's given person is available in those images then again the system will check and classify whether those images are individual images or group images.After that, the system will classify all the group images.

So, then the system will capture all the facial images of each person in these classified group images and finally take the overall percentage of those facial captures and display who are the most associated people of a certain Instagram user.

4. Results and Implementation

According to the results of the comparison on the face recognition technologies in Table 1, the most suitable technology for this proposed system is Neural Networks. Because the Neural Networks are the most suitable face recognition and face similarity checking technology for this system.

Also, when comparing the web scraping tools such as Selenium, Beautiful Soup, Mechanical Soup and Playwright, the most effective and matching scraping tool for this system is Selenium web scraper.

5. Conclusion

Instagram is currently the most widely used social media platform in society. Sadly, some individuals misuse it for a variety of illicit actions. However, some of these illicit acts are the root cause of crimes, murders, suicides, etc. Therefore, it is essential to build a system to retrieve data from Instagram accounts and evaluate that data to determine the major associates of each account.

Technologies for data retrieval, analysis, and face recognition are widely employed in the modern world for a variety of purposes. In this paper various Data Retrieving, Analyzing and Facial Recognition algorithms are discussed, along with their benefits and drawbacks and this paper gives a clear idea about the proposed new system for identify who are the most associated people of a certain Instagram user by Image Processing.

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Acknowledgment

I would like to express my heartiest gratitude to my lecturers for giving me the support and guidance I required in order to complete this research with their various other commitments.Also I wish my sincerely thank for supervisors for their contributions to the success of my research.

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An Augmented Reality based approach towards Furniture Shopping

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***Abstract*:** *In the furniture industry, all the companies have been involved in furniture designing, manufacturing, distributing, and selling decorative household equipment. But the furniture industry is one of the major industries facing challenges these days. The researcher has gone through the existing and current furniture selling applications. The researcher has done interviews, observations, and questionnaire distribution among furniture sellers and clients during the process of identifying the problem. So, purchasing the best suitable furniture item according to the customer expectation is the main challenge that people has faced during online purchases. That means, it can be challenging to visualize how furniture will look in our homes and work with the décor already in place. Researchers pointed out that augmented reality can quickly resolve this problem. The usage of augmented reality in industrial applications is still relatively limited in a world where technology rules. Augmented reality is a field of image processing that deals with the combination of the real-world and virtual environment. Researcher has used ARCore plugins through the furniture item visualization. Users will be able to see how the item will appear in their space in real-time. The researchers' aim was to implement an application for smartphones to assist customers who purchase interior items directly online by allowing them to virtually see how their area will look after making the purchase. After implementation, researcher compared this developed system with the related current world applications and scenarios in the system evaluation process. Those system evaluations shows that the proposed system will be more supportable to make the current furniture industry more profitable.*

Keywords: *Augmented Reality, AR Furniture, ARCore*

1. Introduction

Each household and its individuals of it have an essential need for furniture. Nonetheless, the majority don't browse furniture stores frequently. If people need to invest money and give it more thought before purchasing it, it makes absolute sense. Since customers rarely return, the shop should occasionally alter its products to maintain its customers' experiences enjoyable. In this project, the center will provide clients who need furnishings with the best possible experience. The concept is based on Sri Lankan furniture stores that use well-known furniture manufacturers there. Here, the researcher will talk about the typical practice of implementing current systems when discussing the entire perspective of the online furniture store. Such an online furniture store application often allows users to search through the various pieces of furniture that are offered by the retailer. A customer must register with the system once they want to check out. A selection of furniture items in various models and designs are available in that store. Users can browse the products by category because there are numerous products in each one. The consumer has the option to add a product to his shopping basket if he likes it. Users could then complete the payment. Finally, customers have payment options. So other than above mentioned normal procedure this will improve the customer interaction by adding the feature of taking the real-time experience of the object. The special feature of this application is, that the application can detect the measurements of the real surface area and adjust the 3D furniture model in accurate scaling. The major objectives of the research are, to recognize and compare the features of the existing and current furnished eCommerce applications, understand the usage of ARCore, and make use of the Sceneform SDK, which includes a PBR (physically based renderer) to facilitate the process of presenting products in the actual world and take the accurate scaling of both the 3D furniture model and the surface area in which it will be placed.

2. Literature Review

A. Feature extraction of existing and current applications

These findings further support the idea of implementing the furnished e-commerce AR Application. The work of "Houzz Interior Design Ideas" by Reuksupasompon, P et al (2017, pp.1-6) is an AR furniture store application that allows users to place virtual furniture products in their surroundings. The procedure behind this application is simple. The application requires users to first take a snap of any preferred location of their home, then position the virtual furnishings by hauling it to the ideal place and planning the presentation utilizing two fingers to resize the furniture product. Furniture will appear on the top of the selected background, with the ability to move and resize the overlay image. The strengths of this application were, that it is very easy to use, it simply shows the user the way of working and it can be downloaded easily because of less storage. Limitations of this application where this application does not support 3D views. It still uses flat 2D images and does no scale relative to the real word environment. The present study by Cruz, E. (2019) makes several noteworthy contributions to getting a 3D view of furniture products and it can be automatically scaled to fit the size of a real-world environment at a 1:1 ratio. It is an IOS application which is named "Furniture Drop: AR Room Planning App" invented by Asher Vollmer. This application uses the ARKit framework which was recently developed by Apple. It can integrate the iOS device camera and motion features which help to create an immersive experience of augmented reality in an application. When discussing the constraints of this application it only supports a limited number of devices.

More recent attention has focused on the IKEA application which Ozturkcan, S. (2021) is a famous IOS application developed by using ARKit SDK. It helps customers to do a product review before they obtain it by scanning any specific product, customers will then get associate AR expertise. By incorporating AR within the promoting strategy, mechanically a buzz is formed concerning the whole since the technology goes on the far side of the standard tools that area unit utilized by marketers, it provides associate expertise as on the brink of the important issue as is.