Project 1 Proposal

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1. Problem Statement

Searching engine is a wide used tool to investigate what we want to know on the Internet by entering some keywords. But what if we find a picture and what to know more about stuff in that picture? A technique called reverse image searching is developed to search the internet with a target image instead of using keywords. It is really helpful when we want to track the copyright of an image before using it, learn more interesting fact about a photo we find, or even find more information about a photo that recording the trail of a crime.

There are already a few applications about reverse image searching developed by big technical companies. I want to conduct a research to see how we can improve the efficiency and accuracy of this technique and how we can evaluate these dimensions.

1. Application

Several applications are already developed based on reversed image search system.

Many people have heard of TinEye though they are not familiar with reverse image searching. It is one of the oldest tools in this area. Big technical company such as Google also offer the image-based search which is being used by people from all over the world. Google image search can provide different sizes of images against an image. Google retrieves the pages that contain your uploaded image. There are many other products such as Bing image search which is enable to identifies the elements of a picture and finds results that include all of those elements.

1. Related work:

Flavio studied on rare scientific images that lack metadata and developed new techniques to conduct fast searches from large pictorial datasets without labels in his paper "Reverse image search for scientific data within and beyond the visible spectrum". Recommendation systems that handle scientific images are rare, particularly if records lack metadata. This paper introduces new strategies to enable fast searches and image ranking from large pictorial datasets with or without labels. The authors developed a deep neural network software which is called pyCBIR in order to search scientific images by content. pyCBIR exploits convolutional layers with locality sensitivity hashing for querying images across domains through a user-friendly interface. They also tested pyCBIR search capabilities using three convNets against four scientific datasets [1].

Gaillard focused on finding similar images in an image collection with a very large scale in his paper "Large scale reverse image search". They applied a perceptual hash-based solution and testing the speed and the precision of several existing image features. The study is useful in terms of Intellectual property and crime prevention because of it tries to find the original of an image in a large-scale image database given a slightly modified version of it. A technical solution for reverse image search consists of an image representation and a distance measure between these representations. The image representation should be easy to store in a database. To measure the similarity, we should first extract the feature vectors and then measure the distance between them. The authors focused their study on perceptual hashing because it appeared to be significantly faster than the descriptors from other libraries. A perceptual hash function is a type of hash function that has the property to be analogous if inputs are similar. The perceptual hash function extracts some features of media objects that are invariant under slight modifications. For example, knowing how a compression algorithm works, it is possible to find some invariant features and then design a perceptual hash based on them [2].

Bitirim evaluated the reverse image search performance of Google in terms of Average Precisions at various cut-off points in "an Evaluation of reverse Image search performance of Google". They picked data from five different categories: "Fashion", "Computer", "Home", "Sports", and "Toys". Average precision at the cut-off points 20, 40, 60, 80, and 100 were calculated for each category. The performance range is from 42% for “Toys” category at the cut-off point 100 to 71% for “Home” category at the cut-off point 20. Obviously, the search engine performance decrease with the increase of cut point. Nearly half of the results are not relevant to the category of the Image Queries when the cut point is high [3].

1. Open Source:

I found an open-source project called “Search by Image” on Github. Search by Image is a browser extension that makes effortless reverse image searches possible, and comes with support for more than 30 search engines. The extension helps to verify the authenticity of images, and assists in the identification of false information on social media. Search by Image is also popular among photographers, helping artists explore how their work is shared on the web, while shoppers find it valuable for discovering similar products at discounted prices [4].

Reference

[1]. Araujo, Flavio HD, et al. "Reverse image search for scientific data within and beyond the visible spectrum." Expert Systems with Applications 109 (2018): 35-48.

[2]. Gaillard, Mathieu, and Előd Egyed-Zsigmond. "Large scale reverse image search." XXXVème Congrès INFORSID (2017): 127.

[3]. Bitirim, Yiltan, et al. "an Evaluation of reverse Image search performance of Google." 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC). IEEE, 2020.

[4]. https://github.com/dessant/search-by-image#readme