**CHAPTER 1**

**INTRODUCTION**

**1.1 Introduction**

A logo is a graphical mark used to identify a company, organization, product or brand. Logos are used to represent a company’s name, a particular product or service and are used heavily in the marketing of products and services. Logos have become an integral part of a company’s identity and a well-recognized logo can increase a company’s goodwill.

A logo usually has a recognizable and distinctive graphic design, stylized name or unique symbol for identifying an organization. It is aﬃxed, included, or printed on all advertising, buildings, communications, literature, products, stationery, vehicles, etc. Logo can be seen anywhere in the surrounding in our daily life, such as in the streets, supermarkets, on the products or services, on administrative documents, etc.



The last decades have seen an explosion of the amount of digitized document libraries. In order to properly index these documents, it is necessary to categorize as well as to retrieve them. Throughout the years, several document classiﬁcation systems have been investigated based on OCR and analysis of text by natural language processing. However, OCR systems reach good performance only with typewritten and printed documents, and natural language processing depends greatly on the context. On the other hand, graphical objects in document images such as logos, stamps, photos, graphs and diagrams contain much important information. In particular, logos are commonly used in documents, especially in business and administrative documents. It allows us to determine the source of the documents quickly and accurately, without any textual transcription and at a low cost. This brings about diﬀerent interesting issues, such as logo detection, logo recognition, and logo spotting.

This project presents a logo spotting framework applied to spotting logo images on video frames and focused on logo categorization and frame retrieval problems. The spotting method is formulated in terms of searching for matches between all interests points of query logo images and of video frames. Interest points are extracted from images and are described under local feature vectors by local detectors and local descriptors.

The logo spotting problem can be deﬁned as the location of a set of regions of interest from a document image which are likely to contain an instance of a certain queried logo without explicitly recognizing it. Whereas logo detection attaches special importance to detecting if logos occur on a document or not. Logo recognition focuses on recognizing an unknown logo image as one in a library (a set) of known logos. This usually refers to recognize pre-segmented (isolated) logos. However, it usually relates to previous segmentation. Meanwhile, logo spotting is able not only to solve logo detection and logo recognition problems but also can locate logos appearing on documents. In addition, to avoid the paradox problem of the relationship between recognition and segmentation performance 1, logo spotting architectures should perform both recognition and segmentation simultaneously.

In the Document Image Analysis and Recognition (DIAR) ﬁeld, two common applications related to document images are document categorization application and document retrieval application. Document categorization application aims to categorize a query document based on given information. Hence, the given information is a set of logo images as a gallery, and the query document is then categorized following this logo gallery. Therefore, a query logo image is the information to retrieve relevant documents in a set of documents based on logo spotting.

Numerous inventions and techniques have contributed to the contemporary logo, including [cylinder seals](https://en.wikipedia.org/wiki/Cylinder_seal) (c. 2300 BCE), [coins](https://en.wikipedia.org/wiki/Coin) (c. 600 BCE),[[7]](https://en.wikipedia.org/wiki/Logo#cite_note-7)[[8]](https://en.wikipedia.org/wiki/Logo#cite_note-8) [trans-cultural diffusion](https://en.wikipedia.org/wiki/Trans-cultural_diffusion) of [logographic](https://en.wikipedia.org/wiki/Logograph) languages, [coats of arms](https://en.wikipedia.org/wiki/Coat_of_arms),[[9]](https://en.wikipedia.org/wiki/Logo#cite_note-9) [watermarks](https://en.wikipedia.org/wiki/Watermark),[[10]](https://en.wikipedia.org/wiki/Logo#cite_note-FOOTNOTEMeggs199858-10) [silver hallmarks](https://en.wikipedia.org/wiki/Silver_hallmarks), and the development of [printing technology](https://en.wikipedia.org/wiki/History_of_printing).

As the [industrial revolution](https://en.wikipedia.org/wiki/Industrial_revolution) converted western societies from [agrarian](https://en.wikipedia.org/wiki/Agriculture) to industrial in the 18th and 19th centuries, photography and lithography contributed to the boom of an advertising industry that integrated [typography](https://en.wikipedia.org/wiki/Typography) and imagery together on the page.[[11]](https://en.wikipedia.org/wiki/Logo#cite_note-FOOTNOTEMeggs1998138%E2%80%93159-11) Simultaneously, typography itself was undergoing a revolution of form and expression that expanded beyond the modest, serif typefaces used in books, to bold, ornamental typefaces used on broadsheet [posters](https://en.wikipedia.org/wiki/Poster).

The arts were expanding in purpose—from expression and decoration of an artistic, storytelling nature, to a differentiation of brands and products that the growing middle classes were consuming. Consultancies and trades-groups in the commercial arts were growing and organizing; by 1890, the US had 700 lithographic printing firms employing more than 8,000 people.[[13]](https://en.wikipedia.org/wiki/Logo#cite_note-FOOTNOTEMeggs1998148%E2%80%93155-13) Artistic credit tended to be assigned to the lithographic company, as opposed to the individual artists who usually performed less important jobs.

Innovators in the visual arts and lithographic process—such as French printing firm Rouchon in the 1840s, Joseph Morse of New York in the 1850s, Frederick Walker of England in the 1870s, and Jules Chéret of France in the 1870s—developed an illustrative style that went beyond tonal, representational art to figurative imagery with sections of bright, flat colors.[[13]](https://en.wikipedia.org/wiki/Logo#cite_note-FOOTNOTEMeggs1998148%E2%80%93155-13) Playful children's books, authoritative newspapers, and conversational periodicals developed their own visual and editorial styles for unique, expanding audiences. As printing costs decreased, literacy rates increased, and visual styles changed, the [Victorian decorative arts](https://en.wikipedia.org/wiki/Victorian_decorative_arts) led to an expansion of typographic styles and methods of representing businesses.

**1.2 Objective**

Eﬃcient and accurate object detection has been an important topic in the advancement of computer vision systems. With the advent of deep learning techniques, the accuracy for object detection has increased drastically. The project aims to incorporate state-of-the-art technique for object detection with the goal of achieving high accuracy with a real-time performance. A major challenge in many of the object detection systems is the dependency on other computer vision techniques for helping the deep learning based approach, which leads to slow and non-optimal performance. In this project, we use a completely deep learning based approach to solve the problem of object detection in an end-to-end fashion. The resulting system is fast and accurate, thus aiding those applications which require object detection.

With logo detection technology, companies can evaluate a campaign’s ROI by analyzing any media coverage of a sponsored event. With the information on brand positioning in hand, it is easy to calculate the advertising equivalent value or determine the most impactful events to sponsor. With further extrapolation, companies can monitor the context of media coverage and track whether their brand is shown with positive or negative information, providing even more knowledge for the marketing team.

The main objective of this work is to propose a framework for logo spotting in videos. The main spotting method within our framework is formulated in terms of a search for matches between all interest points of query logo images and of video frames. Interest points are extracted from images and are described by local feature vectors which are computed by local detectors and local descriptors.

**1.3 Problem statement**

The more complicated problem (this project), of object detection involves both classiﬁcation and localization. In this case, the input to the system will be a video frame, and the output will be a bounding box corresponding to all the logos in the image, along with the class of object in each box.

A well known application of object detection is face detection, that is used in almost all the mobile cameras. A more generalized (multi-class) application can be used in autonomous driving where a variety of objects need to be detected. Also it has a important role to play in surveillance systems.

These systems can be integrated with other tasks such as pose estimation where the ﬁrst stage in the pipeline is to detect the object, and then the second stage will be to estimate pose in the detected region.

It can be used for tracking objects and thus can be used in robotics and medical applications. Thus this problem serves a multitude of applications.

**1.4 Scope of the project**

**1.5 Motivation**

The current approach to computing such statistics has involved manually annotating broadcast material, which is tedious and expensive. To address these problems, we have developed an automated tool for logo detection and visibility analysis that provides both raw detection and a rich set of statistics.

The main focus of this project is to implement a Deep Learning Environment in a computational and modelling infrastructure, that must be dynamic and error prone. A Dynamic Environment means that it must be easy to adapt and update to the needs, because the Deep Learning topic is a continuous Research and Develop, where it comes really hard to let working everything and be always up to date.

**1.6 Project Report Organization**

The rest of the dissertation process as follows.

Chapter 2 : focuses on literature survey which helps to understand existing algorithm/mechanism and motives to develop the new algorithm with a new approach to overcome the drawbacks of the existing algorithm/mechanism.

Chapter 3 : The software requirements specifications which gives the hardware, software requirements with user and external characteristics.

Chapter 4 : System design gives the overall description of the project modules.

Chapter 5 : Deals with implementation.

Chapter 6 : presents testing of the modules along with test cases and results.

Chapter 7 : gives the snapshots of the project.

Chapter 8 : conclusion and future work.