

1. Introduction

Augmented Reality (AR) is a technology that has continually evolved since 1968 with the Sutherland's[1] "Sword of Damocles" project and is defined by Azuma[2] as a "variation of environments (VE)". The popularity of Pokémon GO has put AR in the spotlight and it has continued to grow in popularity. Image Processing is a sub section of Computer Vision, designed to process digital images using Kernels. The project examines the iteration of Image Processing, a method that can be used to scan image and process all the pixel data within the image.

2. Aims and Objectives

The aim of this project is to develop two edge detection algorithms, Sobel and Robinson and compare in terms of Speed, Quality and Memory used. To achieve this, 5 objectives are described.

1. Establish an Understanding of Image Processing and the Principles.
2. Establish an Understanding of Augmented Reality.
3. Provide a literature Review of Augmented Reality, its History, The development and current and future trends in the fields of the public sector.
4. Provide a Case Study detailing algorithms in Edge and Corner Detection, Approaches by professionals in the field and propose own solution.
5. Develop an edge detection algorithm.
6. Analyse results of performance and quality of the new images calculated.

3. Methods

The research methods consist of using the positivism philosophy due to the project dealing with hard data. The strategies used was the Literature Review, Case Study and Implementation of two edge detection algorithms. The development methodology used was the Rational Unified Process, an agile method based on Iterative Development. The phases include Inception, Elaboration, Construction and Transition.

4. Analysis

The tests conducted were in OpenCV and three images were used. Each image was tested and recorded.

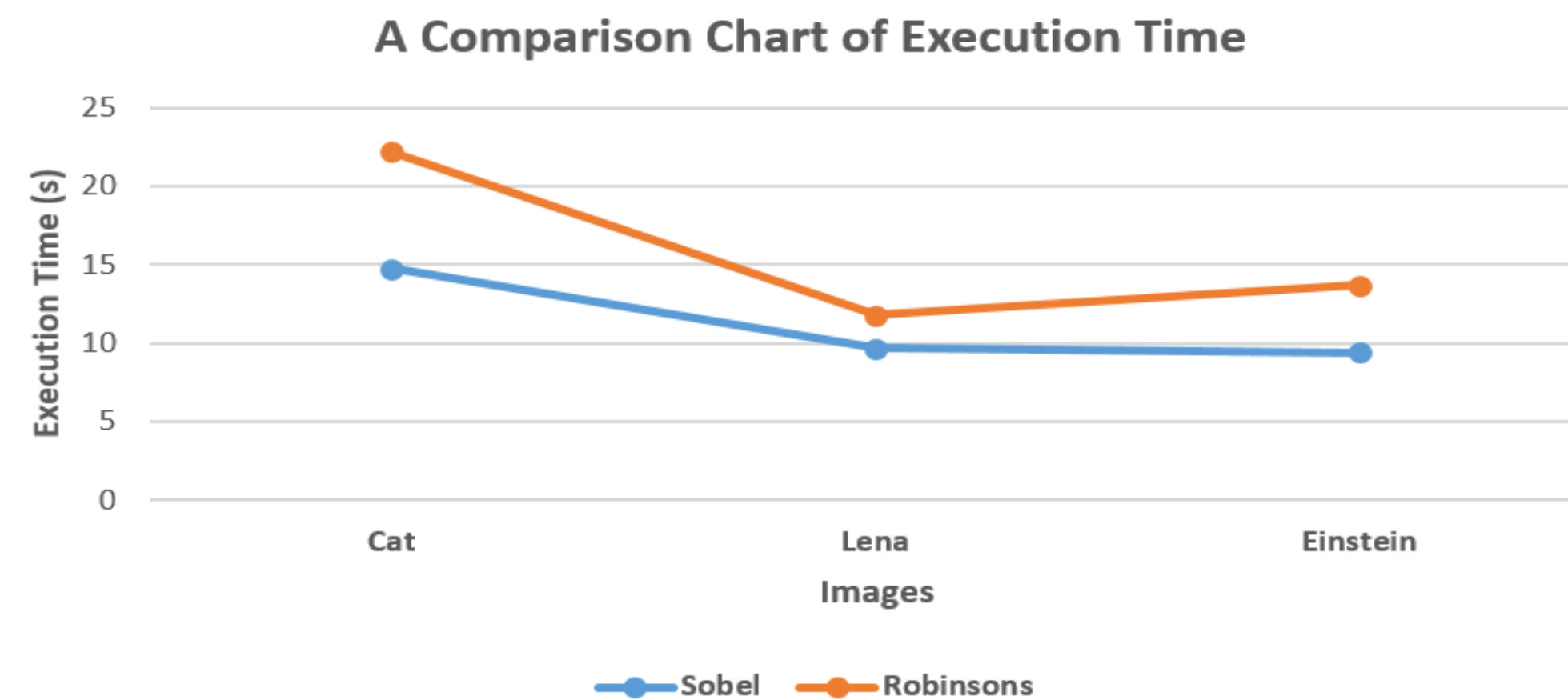


Figure 1 Comparison Chart of Algorithm Speed

The Results above show the Sobel is faster to use due to the usage of two kernels while Robinsons uses eight kernels.

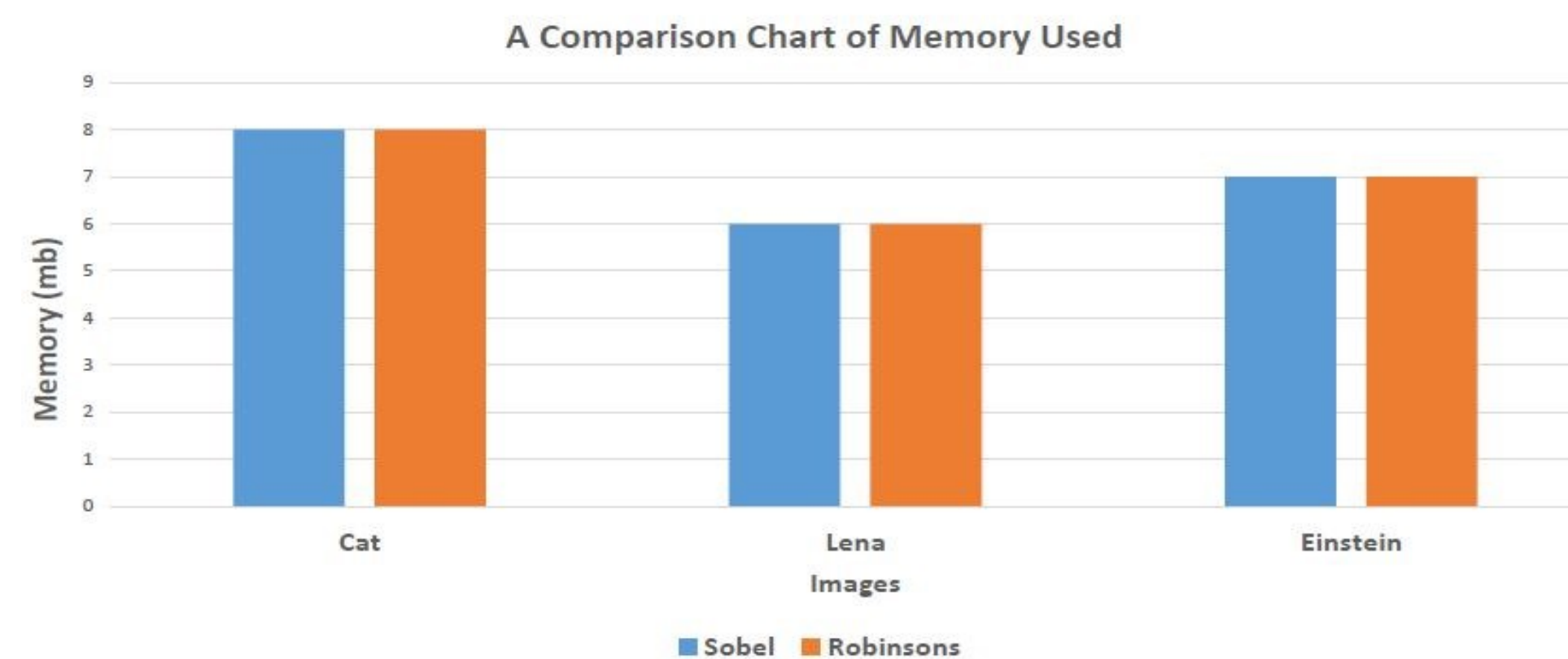


Figure 2 Comparison Chart of Memory usage

The majority of images used equal memory to execute for both Sobel and Robinson.

5. Conclusion

While the implementation of the algorithms in OpenCV was successful, OpenGL was not successful due to time constraints and test results were not recorded. Sobel is the fastest to use while Robinsons detects more edges and uses less memory. In Summary, Sobel can be used for quick process with a reasonable amount of edges however, Robinsons can be used for detecting more edges with the expense of speed.

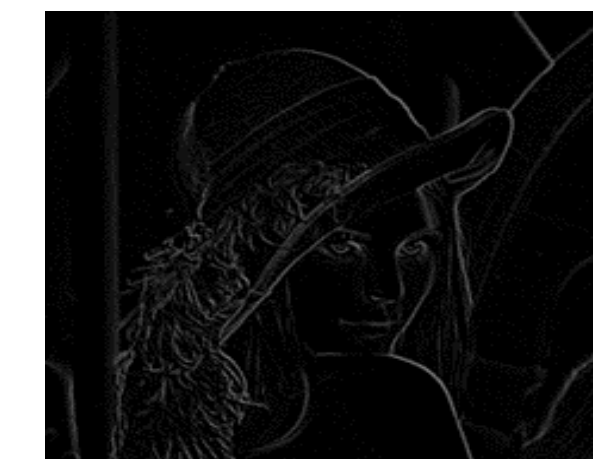


Figure 3 Lena After Sobel

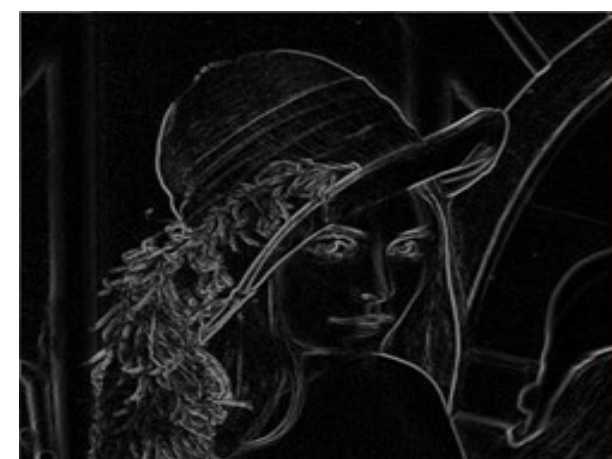


Figure 4 Lena After Robinsons

6. Future Work

With the progress of Augmented Reality gaining public attention creating demand, many aspects such as Human Senses can be discovered. Future research will focus on the possibility that Augmented Reality can enhance human senses as well as improve human lives. The second area of future research is to examine tracking and how marker based applications perform tracking algorithms. The third and final area is to develop a proposed edge detection algorithm designed for AR applications. The end goal is to develop a marker based AR application, with the intent of enhancing everyday lives to improve society as a whole.

7. References

- [1]I. E. Sutherland, "A Head-Mounted Three Dimensional Display," in *AFIPS*, California , 1968.
- [2] R. T. Azuma, "A Survey of Augmented Reality," *Presence: Teleoperators and Virtual Environments*, vol. 6, no. 4, pp. 335 - 385, 1997.