**“Comparing Image Quality Assessment Algorithms with Human Perception for Optimising Image Compression for ExoMars”**

CS39440 Major Project

Author: Charlie Curtis ([chc73@aber.ac.uk](mailto:chc73@aber.ac.uk))

Supervisor: Dr. Helen Miles ([hem23@aber.ac.uk](mailto:hem23@aber.ac.uk))

3rd March 2022

Version 1.0 (Draft)

This report is submitted as partial fulfilment of a BSc degree in

Computer Science (G400)

Department of Computer Science

Aberystwyth University

Aberystwyth

Ceredigion

SY23 3DB

Wales, UK

Declaration of originality

I confirm that:

* This submission is my own work, except where clearly indicated.
* I understand that there are severe penalties for Unacceptable Academic Practice, which can lead to loss of marks or even the withholding of a degree.
* I have read the regulations on Unacceptable Academic Practice from the University’s Academic Registry (AR) and the relevant sections of the current Student Handbook of the Department of Computer Science.
* In submitting this work, I understand and agree to abide by the University’s regulations governing these issues.

Name …………………………………………

Date ……………………………………………

Consent to share this work

By including my name below, I hereby agree to this project's report and technical work being made available to other students and academic staff of the Aberystwyth Computer Science Department.

Name …………………………………………

Date ……………………………………………

Acknowledgements

I am grateful to…

I’d like to thank…

Abstract

Include an abstract for your project. This should be approximately 300 words.

The abstract is an overview of the work you have done. Highlight the purpose of the work and the key outcomes of the work.

Contents

Table of Contents

[2 Background, Analysis & Process 5](#_Toc98490675)

[2.1 Background 5](#_Toc98490676)

# 

# **Background, Analysis & Process**

## **Background**

The most sensible approach to begin seemed to be to conduct some preliminary research into image compression. This included not only image compression algorithms used in a variety of disciplines including medicine, graphic design and military applications, but also, the theory behind image compression, i.e., lossy versus lossless compression, techniques used in image compression, included but not limited to; quantization, discrete cosine transform (DCT), fractal compression – and performance comparisons of some compression algorithms.

The most beneficial preliminary research conducted was that around the area of image compression within medicine. It’s hypothesised that since diagnosis and prognosis of disease have immense consequences - primarily to the quality of life and life-expectancy of humans - the quality of images used as part of these processes are vital, in ensuring the maximum amount of accurate information is portrayed to doctors and nurses dealing with patients. This is useful as it provides an upper ‘boundary’ or guideline, as to what may be considered an ‘unsafe’ level of compression due to the renunciation of various details within an image. In the context of PanCam, this may be a small mineral vein, or water droplet for instance.

This research of course has its limitations, however. Because of the high standard of modern technology and the lack of necessity to send these images over huge distances such as those involved with inter-planetary communication. Compression algorithms are rarely applied in a medical scenario since the risk of missing information is too great to be endured. High quality images are taken and remain high quality to facilitate the work of medical professionals. Because of this, there isn’t much to be learnt about specifically, image quality assessment, since images aren’t routinely compressed, and as such, are always of maximum quality. Given the ultimate judge of image quality is the human visual system (HVS) and subjective study by humans, it can be concluded that - given that misdiagnosis accounts for about 10% of adverse events in hospitals in the UK [2] – image quality is ‘high enough’, according to the HVS in 90% of cases.

# **References**

1.

2. Neale G, Hogan H, Sevdalis N. Misdiagnosis: analysis based on case record review with proposals aimed to improve diagnostic processes. *Clin Med (Lond)*. 2011;11(4):317-321. doi:10.7861/clinmedicine.11-4-317