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**Real Time Night Sky Space Object Mapping Using Enhanced
Computer Vision**

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Abstract

Space is a domain with plenty of unexplored research areas and is slowly gaining popularity among various fields of studies, expecting to be contributed upon. When considering the Computer Science field, there are many approaches one could embark in to contribute to this domain. Automation of various tasks to be done with relevance to this domain is proving to be a common tactic utilized by the industry nowadays. While it is common, the availability towards such resources with regards to this manner is miniscule, especially when considering the commercial viability. Space object detection in night sky images captures via conventional methods such as with a mobile phone camera is a problem that has not been explored during the start of this project.

The documentation provided here will be expanding the domain of the problem and will analyse it. It will cover an in-depth analysis on currently existing solutions / approaches as well as research on this matter, and then will identify flaws / potential gaps in such approaches, which in turn will have proposed solutions to overcome the identified flaws / gaps. In addition, this document will also cover topics such as project requirements, ideal strategies to be utilized, the timeframe and deliverables related to the project. This dissertation focuses on using image processing techniques such as HAAR Cascading alongside classification models that utilize Skymap (star catalogue) data to accurately identify and classify night sky objects in real time. The main dataset utilized for the classification purposes includes the Yale Bright Star Catalogue. It also documents setbacks, extensibilities and technologies used as well. Nocstellar, a mobile application is cultivated as a by-product of the research conducted.

Keywords: Deep Learning, Machine Learning, Skymap, Neural Network, Deep Neural Network, Image Processing, Classification, Detection, Night Sky, Object Mapping