# IMAGE CLASSIFICATION USING GRAPH-AUTOENCODERS

## PROJECT SYNOPSIS

**BACHELOR OF TECHNOLOGY
IN
COMPUTER ENGINEERING**

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**Under the supervision
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## INTRODUCTION

The need for robust and precise image classification systems has become paramount in a world increasingly inundated with visual data. From medical diagnostics to autonomous vehicles, and from content recommendation to security, image classification plays a pivotal role in diverse domains. However, the intricacies and complexities of visual data demand novel approaches that can uncover latent similarities and dissimilarities between images.

This project embarks on a journey to explore the fusion of cutting-edge technologies, where the power of graph theory meets the versatility of autoencoders in image classification. This project also aims to explore the viability of combining graph auto-encoders with a contrastive learning technique which will allow for a completely novel approach to image classification.

## MINOR PROJECT WORK

Existing image classification techniques such as Artificial Neural Network, Decision Tree, KNN and many others were studied. We implemented all the algorithms and a comprehensive comparison was done among them. We found that ANN allows for complex pattern recognition and learning and hence gave the highest accuracy among others, while Decision Trees provide a transparent and interpretable model for classification and KNN leveraged the proximity-based voting to make predictions and hence both gave an accuracy score much lesser than ANN.

## NEXT STEPS

The proposed Graph Auto Encoder model will be implemented for the task of image classification. This model will consist of an image-to-graph converter, an encoder and a decoder whose reconstruction loss will be minimized. Once the reconstruction loss is reasonably minimized, the model will be trained to classify images using their latent graph representation. The model parameters will be fine-tuned to get the best accuracy possible.

This model will then be compared to all the models previously implemented. Their performance will be quantitatively compared based on their accuracy, and qualitatively on other factors such as runtime, complexity and extensibility to different data sources and image types.

## REFERENCES

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