Machine Learning

DSCI-6003-01

Tagliatela College of Engineering

Final Project

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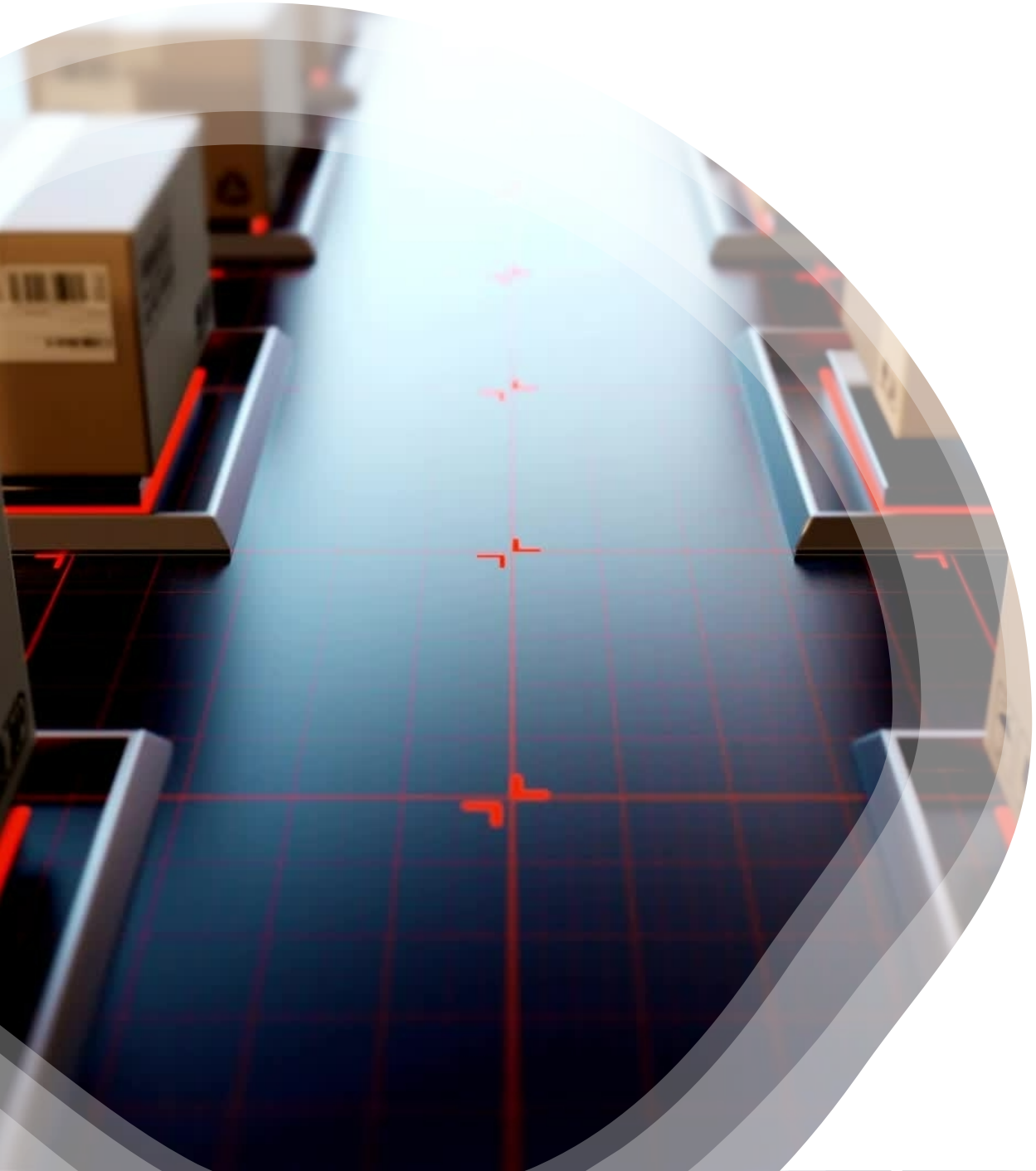
Name: Susendra Musani



Objective:

The primary objective of this project is to explore machine learning techniques for image classification and similarity comparison using the Stanford Cars dataset. We aim to implement an autoencoder for image reconstruction and utilize cosine similarity to identify similar images within the dataset.

Dataset Selection:

The dataset chosen for this project is the Stanford Cars dataset. It contains images of cars classified into various categories. The dataset provides an ideal environment for training and evaluating machine learning models for image classification tasks.

Classification Methodology:

Our approach to classification involves training an autoencoder neural network to reconstruct images of cars. By encoding and decoding images, the autoencoder learns a compact representation of the input data. We then use this learned representation to classify images into different car categories.

Time Series Forecasting Methodology:

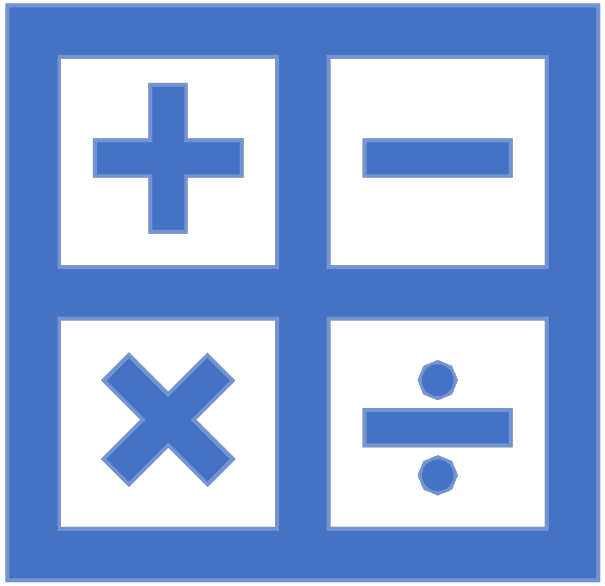
Although not explicitly mentioned in the objective, we'll also discuss time series forecasting methodology as a potential future extension of this project. Time series forecasting involves predicting future values based on past observations, and it could be explored in the context of automotive industry trends or sales predictions.

Abstract:

This project explores the application of machine learning techniques, specifically autoencoders and cosine similarity, for image classification and similarity comparison using the Stanford Cars dataset. We present our methodology for classification and similarity comparison, along with experimental results and insights gained from the evaluation.

Problem Definition:

The main challenge addressed in this project is accurate image classification and similarity comparison in a large dataset of car images. We aim to develop an efficient algorithm that can classify images into specific car categories and identify similar images based on their features.

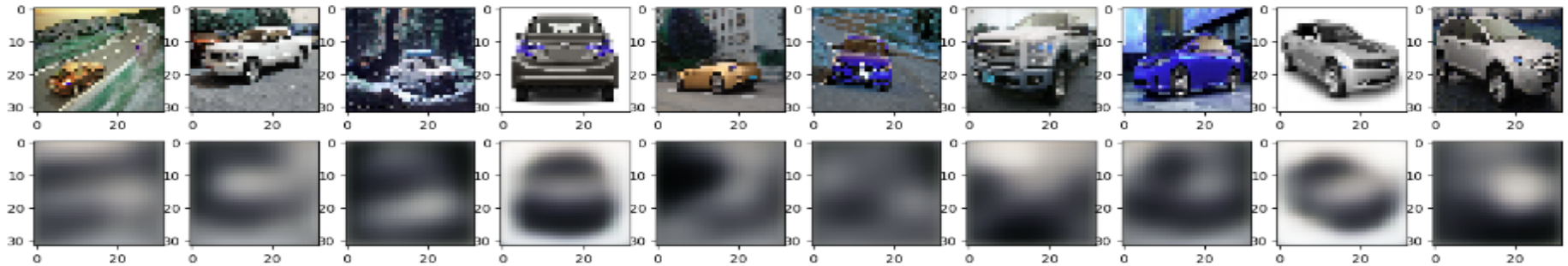


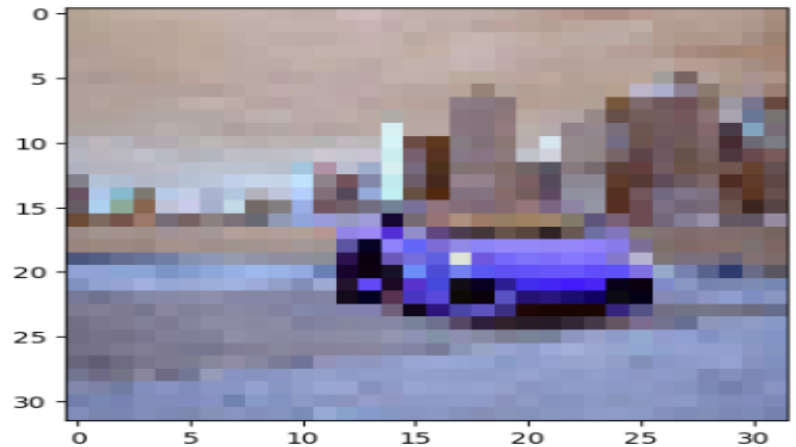
Experimental Evaluation:

We conduct experiments to evaluate the performance of our algorithm on image classification and similarity comparison tasks. We measure the accuracy of image classification and assess the effectiveness of cosine similarity in identifying similar images.

Test Results:

The test results demonstrate the efficacy of our approach in accurately classifying car images and identifying similar images based on their features. We present quantitative metrics to evaluate the performance of our algorithm and provide visualizations to illustrate its effectiveness.





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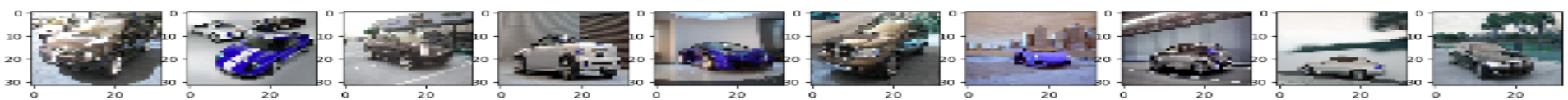

Conclusion:

In conclusion, this project demonstrates the potential of machine learning techniques, such as autoencoders and cosine similarity, for image classification and similarity comparison tasks. We provide insights into the effectiveness of our approach and discuss potential avenues for future research and development.

Thank You!