

**SWINBURNE UNIVERSITY OF TECHNOLOGY**

COS30082 – Applied Machine Learning

Assignment: Bird Species Classification

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# Introduction

In this assignment, we delve into the realm of multi-class classification by leveraging the Caltech-UCSD Birds 200 (CUB-200) dataset. This dataset is a comprehensive collection of bird images, encompassing 200 distinct species predominantly found in North America. It includes a substantial number of 4,829 training images along with detailed annotation files, making it an invaluable resource for developing and testing classification models.

The primary objective of this project is to employ various machine learning techniques to accurately classify the bird species represented in the dataset. To achieve this, we will explore a range of models, from traditional machine learning algorithms to more advanced deep learning architectures. The performance of these models will be rigorously evaluated using metrics such as Top-1 accuracy, which measures the proportion of correctly identified species, and Average accuracy per class, which provides insight into the model’s performance across all classes.

One of the significant challenges in this task is the issue of overfitting, where a model performs well on the training data but fails to generalize to unseen data. To address this, we will implement various strategies, including data augmentation, regularization techniques, and cross-validation, to enhance the model’s robustness and generalizability.

Furthermore, this report will discuss the preprocessing steps undertaken to prepare the dataset for training, the selection and tuning of hyperparameters, and the comparative analysis of the models’ performance. By the end of this assignment, we aim to gain a deeper understanding of the intricacies involved in multi-class classification and the effectiveness of different machine learning approaches in tackling this complex problem.

# Methodology

## 1. Data Preparation

The dataset for this project is Caltech-UCSD Birds 200 (CUB-200), which contains images of 200 bird species primarily from North America. There are 4,829 images available for training, and 1204 images for testing

## 2. Traditional Machine Learning models

## 3. Deep Learning models

# Result and Discussion

# Conclusion

# References