

Land Cover Classification Project - Report Guide and Results Analysis

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1 Final Report

Submission deadline : 24 December 2023

Presentation: 12 January 2024

This project is entirely optional. If you would like to be graded for your work (it will be considered along with the exam), please submit it according to the guidelines.

Consider organising your final report (not exceeding 5 pages) in the following manner as one potential structure.

1.1 Introduction

Provide an introduction to the satellite image classification problem, the possible challenges, and the selected model.

1.2 Model Selection

Explain the rationale behind choosing a specific model for the classification task, detailing its capabilities and any considerations regarding pre-training.

1.3 Data Preparation

Describe the characteristics of the data and any preprocessing steps applied, such as normalisation and resizing.

1.4 Training and Parameters

Outline the training process and specify key parameters employed during the model training.

1.5 Model Evaluation

Assess the model's performance using suitable metrics like accuracy, recall, and F1-score (this list is not exhaustive, exploring other metrics will be appreciated). Include a confusion matrix for a more detailed analysis.

1.6 Results Analysis

Identify well-performing and challenging classes, and explore the model's robustness through, for example, the examination of misclassified instances or noise sensitivity. Provide a thorough interpretation of the results, exploring patterns and potential areas for improvement.

1.7 Results Visualisation

Present visualisations such as learning curves and examples of classified images to complement the quantitative results and highlight key observations.

1.8 Conclusion

Summarise the main findings, discuss model limitations, and suggest potential avenues for improvement.

1.9 Individual contributions

For those working in a group, and in case of task assignment, specify the contribution of each member.

1.10 Deliverables

Provide the source code with a focus on readability and comments.

In the report, include visual elements, detailed analysis, and any relevant information you discover.

Place all components in a GitHub repository, preferably in the same location used for practicals.

Additionally, consider creating external modules to house the model and custom functions, for lighter and more organised notebooks.

2 Key evaluation methods

Here are some of the most common methods to evaluate the performance of a machine learning model, particularly in the context of image classification, and to understand its limitations, and potential areas for improvement.

- **Metrics per Class:** Analyse metrics score for individual classes to identify areas of strength and weakness.
- **Confusion Matrix:** Analyse the confusion matrix to understand misclassifications and identify frequently confused classes.
- **Learning Curves:** Investigate learning curves to assess the model's performance throughout the training process and identify signs of overfitting or underfitting.
- **Visual Interpretation:** Inspect misclassified images for visual patterns and potential areas of improvement.
- **Robustness Assessment:** Test the model on unseen or modified data to evaluate its robustness beyond the training set.

This list is not exhaustive and other aspects are to be explored.

3 Tips

Maintain precision and clarity in your explanations to facilitate understanding of the main findings. Use visualisations judiciously to enhance comprehension. Acknowledge the limitations of the model and propose constructive avenues for future enhancements.