Neural networks for crop classification

Satellites offer an efficient tool for monitoring and decision support in agriculture. For this, satellite imagery needs to be combined with models for each specific agricultural crop. The prerequisite for crop-specific models is a map of the region of interest depicting which crop grows where - so called image-based crop classification. With the increasing availability of training data, neural networks (NN) are becoming more powerful for crop classification [1, 2, 3]. The performance of NNs is usually given in task-specific metric, such as F1-score. However, to draw a more complete picture, the energy consumption of the NNs should be taken into account as well. This is the idea behind the green software foundation, which is a cross-industry consortium building best-practices for 'carbon-aware computing'. The goal of this BSc thesis is to assess the performance (F1-score) of existing NNs and compare them with the computation cost to create a new metric for performance assessment.

Research questions

1. Compare existing NN approaches for end-of-season crop classification.
2. Assess the computation (energy) requirements of the existing NN approaches.
3. Develop a performance metric which takes energy requirements and performance into account.

What we offer

We are Terensis during our Pioneer Fellowship, we want to bring our research on agricultural Earth Observation into practice and develop a digital twin of farming systems. We have experience working with crop classification, having co-developed a hierarchical RNN approach [2]. We have developed an open-source python package to work with satellite data - you won’t need to worry about satellite data collection and handling. We have access to multiple large, labelled datasets of agricultural fields as training data [2, 4, 5, 6]. We have the domain knowledge and the resources to get you quickly started with an applications-focused Bachelors thesis.

What we are looking for

- Knowledge in Python.
- You should have taken courses in AI/ML.
- Experience in AI/ML libraries such as pytorch or tensorflow is a plus.
- Experience in geo-informatics is a plus, but not necessary.
- Motivation to work together with domain experts in an application-focused project.

Contact

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References


