

Machine Learning for Humanitarian Uses

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Machine learning can be used to provide humanitarian organisations with interpretation of earth observation data rapidly, accurately and cheaply. This project focuses on issues affecting child labour and food security.

Due to its unregulated nature, brick kilns often use child labour. Locating kilns would allow governments and NGO's to conduct checks on the ground.

2000 known kiln locations in Pakistan were used to train a model and assess different architectures, achieving high accuracy of predicted locations (Fig. 1)

Using transfer learning, the model was also partially retrained on brick kilns in northern India. This resulted in low accuracy, probably a consequence of the small dataset (Fig 2).

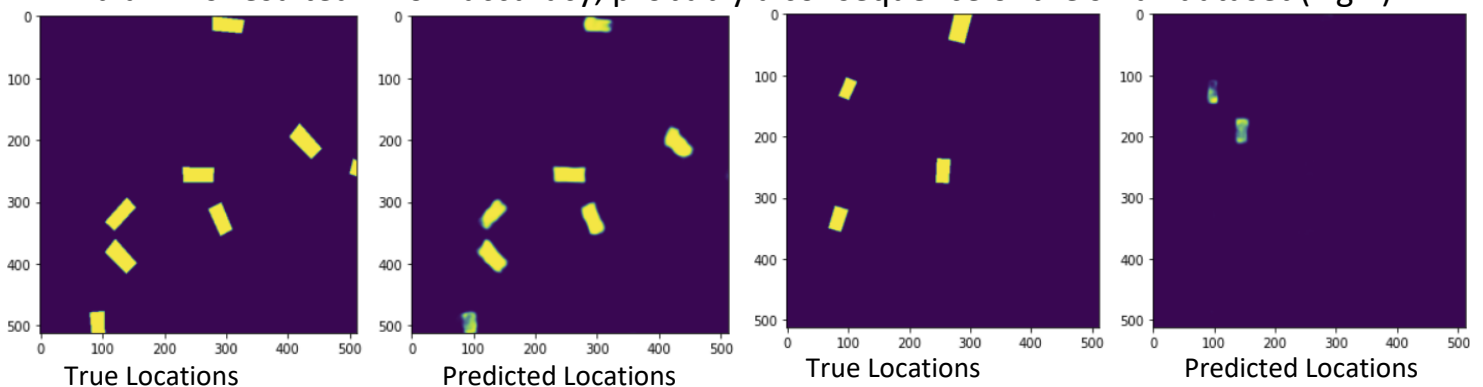


Fig 1. Brick kilns in Pakistan

Fig 2. Brick kilns in India

Cultivation of the narcotic drug Qat uses about one-sixth of Yemen's agricultural area. Farmers choose to grow Qat rather than food crops as they receive a high income per acre, resulting in 90% of food being imported. Qat consumes more than one-third of the water used in the agricultural sector so droughts significantly affect the Qat harvest, causing an economic crisis. Due to the ensuing food insecurity, famine may result. By analysing farm size and crop health, famine can be predicted, and aid distributed ahead of disaster.

In the absence of an available dataset, an area of 12 km² was mapped in OpenStreetMaps using locations provided by ACAPS.

The accuracy of predictions was poor, likely due to overfitting on the limited dataset (Fig 3). The high number of fields that need to be marked in a single image made collecting a large dataset is costly.

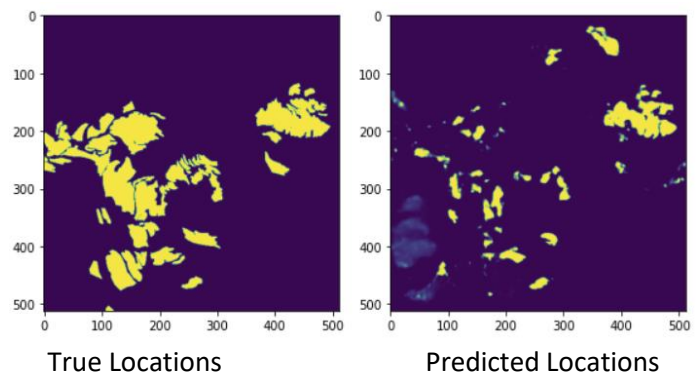


Fig 3. Qat Fields in Yemen

This project showed some success of using machine learning for humanitarian uses. It highlighted the need for a large open access database of key features to reduce the time and cost of acquiring a sufficient dataset.