PARALLEL PROGRAMMING WITH V3-8 TPU

AI USE CASES (HSBE-BIS-BD-0014)

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BACKGROUND :

Multi core processing was born due the disadvantages faced with single core processing:

- Slow run
- Can't run different applications which have heavy computing.
- Processors reaching their physical limitations.

SCOPE:

Nowadays implementing an accurate and fast plant disease detection system has become one of the crucial step in raising the productivity of agriculture in very sustainable way . Many experts have been focused and have relied on detecting anomalies in different plants which have been caused due to a huge number of factors like pests , nutritional deficiencies , and even due to certain weather conditions . However detecting these anomalies have been an expensive, time consuming and also have not produced accurate results . So pushing out all these different challenges , the researchers have ended up in using image processing methods for detecting plant anomalies . Image processing and different machine learning techniques have played a vital role in detecting and recognizing disease at very early stage and has thus also provide accurate results in detection of diseases . Image processing techniques have certain benefits like they can accurately and quickly diagnose the disease caused in a crop in leaves , stems , flowers and even in fruits . Here we are focusing on detecting the disease caused on leaves with the help of parallel programming on a image processing model . Parallel computing has

been used here since they use more than two processors to resolve a single problem . They also help in carrying out large computation by dividing the entire workload between many processors and work through all of them at the same time . Hence they solve any computation in short period of time and they have tremendous amount of data storage capacity . Parallel processing is used mainly for real time complex problems .

FOCUS :

In order to achieve a fast & robust system we will use the concept of parallel programming on a image processing model which will identify a diseased leaf or a healthy leaf(plant pathology). We will use the v3-8 TPU from Kaggle (which provides 30 hours TPU usage for one week) to train our model which will allow us to train the model on all 8 cores i.e, by allowing us to run more than one instruction at a time. They are supported in TensorFlow 2.1 both through the Kera's high-level API and, at a lower level, in models using a custom training loop. In order to increase the speed of TPU we need to increase the batch size . Having larger batch size , it becomes easy for TPU to crunch through the training data in a high speed fashion . Along with we will explain & differentiate the usage of CPU, GPU, TPU & NPU as per parallel programming is concerned covering advantages, disadvantages over one another.

TOOLS/FRAMEWORK USED :

Following are the tools and framework we will work on to accomplish the desired results:

- **Python-** base code
- **Open CV, Pandas,Pytorch, Sk-learn**

TIMELINE :

- **Presentation**: 18th Dec 2020
- **Final deliverables**: 19th Dec 2020