Tech Review

Draft

Group 11: Real-time Seed Identification

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**Abstract**

This Tech Review draft contains 3 pieces of Tech Review of group 11: Real-time Seed Identification. For this draft, tech review focus on hardware. Our project requires some hardware support. As we collecting data, training data, and testing data, we need different type of hardware to finish our job.

## Data Training hardware

* 1. **Overview**

Data Training in our project is very important. In training part, we need a lot of data, a lot of pictures. More than thousands of pictures need to process. In this situation, CPU is not enough. Assuming we process an image using 10 sec. Processing all data may spend 2-3 days. We need other ways, for example, GPU.

* 1. **Criteria**

GPU cards need to have power to process data fast. Also, GPU card we use need to be programmable. Which means we should write our program base on GPU card. Otherwise, graphic cards need have big data analytics functionality.

* 1. **Potential Choices**
     1. XFX – AMD Radeon R5 220

A graphic card which sometime using in gaming computer. Its PowerTune technology dynamically adjusts the clock speed to provide the optimal performance. With its dual display feature, it enhances your productivity and gaming experience. It is a cheap graphic card, but its processing ability is not very good.

* + 1. Nvidia GeForce GTX 1060

A very powerful graphic card. GTX 1060 provides high processing speed for PC. I am using the same series of graphic card in my pc. It works well with parallel programming and computing. But it has a problem: GTX 1060 cost too much.

* 1. **Conclusion**

The big number of data in this project cause us to think about parallel computing. But single CPU (even multi-core CPU) isn’t enough. For our project, due to big amount of data, we must concern GPU programming and computing.

### Camera

* 1. **Overview**

Same like Data collection, we need camera. After data collection, all of our data is digital image data. What we need is real image data. Data should come from camera. In this part, we focus on hardware. A good camera could provide us good picture. Which means the data is cleaned.

* 1. **Criteria**

The Camera should provide clean data of image. But don’t need too powerful because we will have normalization, which means normalize all data in same type, size. We must make sure there is no other things on the camera.

* 1. **Potential choices**
     1. EOS 1D Mark II/III/IV

A series of Canon cameras. This set of cameras require minimum lightroom version at 3.0, the lowest version required. It provides tethered camera setting. Using EOS 1D Mark can easy import photos from camera into PC. The only problem is this series of cameras do not support Linux. In other words, it can easy import photos in both Microsoft Windows, but require third party to do it on Linux.

* + 1. Nikon D3, D3S, D3X

This series of Nikon cameras require lowest version of lightroom, as well. These series of cameras work well at Microsoft Windows and MacOS. Nikon cameras save images into computer but not flash card, which means the only way to use Nikon series is tethered camera. Only one Nikon camera can be attached at a time, but it doesn’t affect our project. This series has same problem with Canon, require third party software on Linux.

* 1. **Conclusion**

Camera is important, a good camera means good picture. The camera must be clean. In this case, we can have good pictures.

### Data Testing hardware

* 1. **Overview**

Data collection in this project is very important. The more data we have, better rate we have. Data collecting model here is not a software model, it is a hardware model. We should have more than thousands picture (even worse, million.) It is almost impossible to get these pictures by hand.

* 1. **Criteria**

Hardware model could take picture by itself. Don’t need normalization or other kind of works. Only need to take picture. At least 1000 picture in 1-2 hours.

* 1. **Potential choices**

Hardware machine with a script by ourselves. There is a machine which was built by ME group, it can move seeds slowly. Using camera and a script, we can design a machine that take picture.

* 1. **Conclusion**

For this project, in testing, picture is very important. A big amount of data is also necessary.