Recognizing Famous Places on Android

Seminar
Practical Applications of Multimedia Retrieval
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Tim Oesterreich, Romain Granger

Supervisors:
Haojin Yang, Christian Bartz
Prof. Dr. Christoph Meinel

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1 Introduction

As deep learning is becoming an increasingly big influence in everyday applications, more and more focus is put into increasing its distribution to different platforms. During the winter semester 2016/2017 a project seminar emerged, that laid focus on developing a mobile phone application for Google's Android operating system that is capable of recognizing famous sights in big cities.
Modern smartphones can in some cases outperform mid-range notebooks from a couple of years ago and, most interestingly, often have a dedicated GPU[1]. GPUs are usually used for deep learning because of their high parallelization capabilities.
Part of this seminar was the evaluation of a fairly recent deep learning framework called CNNDroid, which uses GPU acceleration for classification and promises 60 times faster speed and 130 times better power usage than

2 CNNDroid

CNNDroid is

2.1 Setup and Integration into Android Project

- Clone From Github
- Copy Files into Android Project
- Necessary Import: import network.CNNdroid
- Create CNNDroid Object
- Call CNNDroid::classify

2.2 Structure Overview of necessary CNNDroid Files

- Layer Blob Files
- Definition File
- Labels

[1] Graphics Processing Unit

2.3 Convert Trained Models into CNNDroid-compatible Format

Short Introduction to MessagePack

- how to use convertion script
- compatible frameworks
- compatible layers

2.4 CPU vs GPU performance

Comparison of computation time of CPU (sequential) and GPU (parallel) mode on in-memory images using CIFAR10 (in-memory to minimize error using camera, CIFAR10 could be exchanged with CaffeNet if too fast)

3 Google Streetview Crawler

3.1 Setup of viewing parameters

Explain csv file

3.2 State of Automation (i.e. taking one image per viewing angle)

3.3 Current Limitations

Full automation not possible as of current street view API state; wrong latitude/longitude; Streetview Image API returns different images than JavaScript API (which is being used on google maps website)

3.4 Possible Improvements

Use Classifier to identify things in photsphere

3.5 Google Places API/shutterstock/Flickr

4 PlaceRecognizer Application

Overview: What does it do. Whom is it for. How does it achieve its task?

4.1 CNNDroid Integration/Image Classifier

Explain ImageClassifier Class; Including Variables that need adaption when changing Layers or DataSets
How to put msgpack on phone

4.2 Real-Time Frame Capture

How does the camera talk to the Image Classifier?

4.3 GPS Logger

How do we get GPS values and how can we integrate them?

4.4 Wikipedia Parser

How do we get the text for a classified image from Wikipedia?

4.5 How to setup project in Android Studio

5 Outlook

Literatur

[1] Seyyed Salar Latifi Oskouei, Hossein Golestani, Matin Hashemi, and Soheil Ghiasi. Cnndroid: Gpu-accelerated execution of trained deep convolutional neural networks on android. In *Proceedings of the 2016 ACM on Multimedia Conference*, MM '16, pages 1201–1205, 2016.

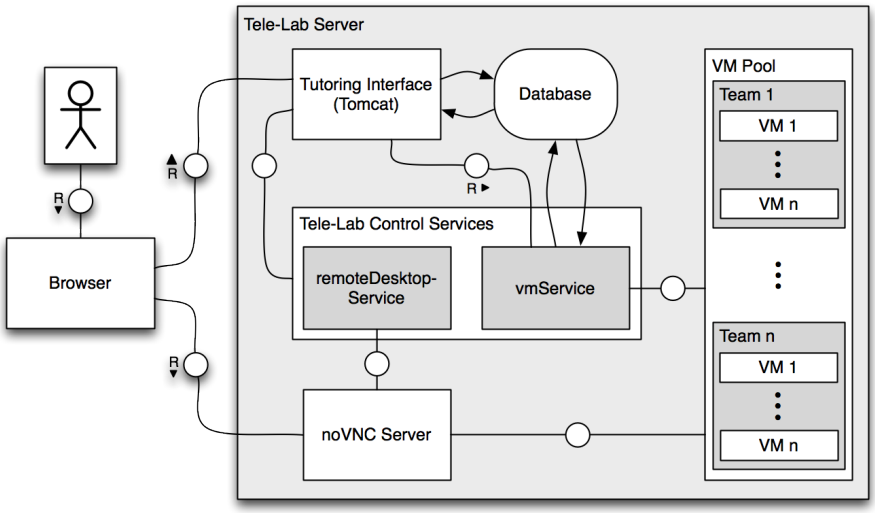

Abbildung 1: Eine Abbildung, Quelle: [1]