Department 07
Master Computer Science

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Deep learning - Dog Breed Classification

Realization of an native Android app using deep learning algorithms

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Contents

1 Introduction

1.1 Deep learning

- what is deep learning -¿ purpose, usage, current research projects, state of the arts

1.2 Terms of Referencee

- dog breed analyzer -¿ goals, purpose,
-¿ high perfomance computing but native android app

2 Methodological fundamentals

2.1 Common Frameworks for Deep Learning Applications

- some examples, tensorflow (tensorflow slim -¿ High level api for easier use, tensorflow lite), Caffe, Keras, Torch, PyTorch, ...
https://datahub.packtpub.com/deep-learning/top-10-deep-learning-frameworks/

2.2 Common Models in Deep Learning Applications

- short differences between different architecuteres (?, CNN, RNN)
- AlexNet, Mobilenet, Inception, VGG, -¿ short decsription, useCases, important things, differences

2.3 Qualified Models for mobile App Integration

- Mobilenet, Inception etc -¿ short decsription, useCases, important things, differences

2.4 Key requirements for an appropriate dataset

- generall why you need a huge dataset -¿ different backgrounds
- self trained needs a huge dataset, a lot of computing performance and time
-¿ so use pre trained, if small dataset.
-¿ pretrained used millions of pictures (e.g. ImageNet)

3 Concept

3.1 Frameworks

- tensorflow -¿ why

3.2 Model based Architectures

- general architectures of models -¿ Mobilenet, Inception

3.3 Application based Architecture

4 Realization

4.1 dataset

4.2 hardware environment

used CPU, GPU -¿ NVIDIA, handys

4.3 software environment

- Bazel, Java, Android Studio, Python, Operating System
- Android system

4.4 installation of software

- software environment

4.4.1 Tensorflow based on Python

4.4.2 Tensorflow based on Bazel

- e.g. Workspace changes for Android SDK, msse4.2

4.4.3 Installing Android Studio and its Delevopment Kit

- also possible with bazel but easier Android studio (needs correct versions of sdk, ndk)
- SDK, NDK
- IMPORTANT: tf versions updaten (same as trained)

4.5 building the models

-¿ evtl extra subsubsection:
- execution methods -¿ Bazel and Python (incompatible versions)
- Mobilnet -¿ steps, optimierung
- Inception -¿ steps, optimierung
- time related differences of execution
-¿ time CPUs/GPU

4.6 Output Tests and Validation

- test pictures and if it works -¿ label image
- validation script?!

4.7 Implementation of an native Android App

- list all necessary things to do (e.g. tensorflow version, Interpreter -¿ load Model)

4.8 Deployment and Validation

5 Evaluation

- prio von nierdig zu hoch
- regarding implementation time

- regarding performance
- regarding quality in accuracy
- handy perfomance?

6 Conclusion

- tutorials not complete, different
- which model is better
- prospects, improvements, Recommendations