Project Plan

Master Thesis MSE: Acoustic Scene and Room Classification for Real-Time Applications
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Tasks

Prestudies
Read previous papers and works
Research similar image classification methods
Build CNN strategy (Single-Shot Detector)

WP1: Dataset Creation
Collect label informations & discuss
Order and setup recording equipment
Record dataset
Postprocess dataset
Review recorded dataset
Outcomes WP1:
- Recording equipment and software
- 24h of qualitative audiological recordings in indoor/outdoor locations resp. Rooms

WP2: CNN Training
Write import adapter for recorded dataset
Plan final learning architecture (2D labels)
Setup Keras learning scripts
Train NN and tune optimization parameters
Retrain & Apply Crossvalidation
Tune model (opt. build ensembles)
Review and collect results
Outcomes WP2:
- accurate NN model with ≈70% classification accuracy
- dedicated label prediction system

WP3: CNN Optimization
Introduction to EA library (Fabio)
Create adapter for pretrained model from WP2
Optimize architecture on MAC
Optimize architecture on accuracy
Review results and select best model
Quantize model to 8 bit resolution
Outcomes WP3:
- optimized CNN model with ≈90% reduced architecture
- EA adaper for acoustic problems

WP4: Implementation Concept
Introduction to BinArray (Mario)
Build basic concept for implementation on FPGA
Refine implementation concept (Mainly Preprocessing)
Review concept and make first coarse predictions
Design specific hardware preprocessing architecture
Review hardware architecture (with Mario/Jürgen)
Outcomes WP4:
- Overview about predicted performance and accuracy for implementations on different FPGA families and subtypes.

WP5: Demonstrator
Setup live recording
Build Python live demonstrator for optimized CNN
Refine demo GUI
Outcomes WP5:
- Interactive Python demonstrator with live plots
- (First implementation steps on FPGA of optimized model)

Documents & Deadlines
Documentation
Paper
Meeting
Midterm Presentation
Colloquium MSE
Deadline Documentation Official
Grade Fix
Final Presentation
Diploma Exhibition
Deadline Documentation Complete *(17:00 ILIAS)*