

## Recommendation for the defense of Ph.D. thesis

Ph.D. candidate: Ondřej Novotný  
advisor: Jan Černocký

I am happy that Ondřej (Ondra) Novotný has finished his thesis under my supervision, and that his long-years efforts have converged to the submission of doctoral dissertation at FIT BUT. The term “supervision” must be precised - Ondra’s work was inspired by Lukáš Burget, he was working in the heart of BUT Speech@FIT’s speaker and language recognition sub-group, and his direct technical supervisors were Pavel Matějka and Oldřich Píchot.

Ondra’s thesis is in the area of automatic speaker verification (SV) and deals with the important steps of signal pre-processing and extraction of low-dimensional vector representations of utterances, nowadays known as “embeddings”. The unifying topic of the whole thesis is **robustness** of SV systems - Ondra addressed it from different angles in the whole SV pipeline: from neural network architectures for noise reduction and speech enhancement, through issues of robustness on the transition from generative systems to discriminative SV, to score normalization, fusion and multi-condition training.

Evaluations and challenges are key activities helping our lab to advance its know-how and assess objectively where we stand in the state-of-the-art. Ondra participated in many such endeavors: NIST SRE 2020, 2019, 2018, 2016, NIST LRE 2017, 2015, SITW 2016, VOICES 2019, VoxSRC 2020, SdSV 2020, and DIHARD challenges. He worked on data preparation, implementation of models and their training, fusion strategies and signal pre-processing. His contribution was the most remarkable in SITW, where, in a small team, we won the evaluation - Ondra was responsible for the back-end, fusion and analysis paper writing.

His results contributed several projects running in the BUT Speech@FIT group, for example Horizon 2020 ROXANNE (Real time network, text, and speaker analytics for combating organized crime) and DRAPAK (Information mining in speech acquired by distant microphones) sponsored by the Czech Ministry of Interior.

Ondra took part in several multi-week international events organized by the speaker and language recognition community, notably at the TOSREW 2015 workshop led by Dr. Cumani in Torino (Italy) and at a similar event organized in summer 2016 in Stellenbosch (South Africa) by Dr. Brummer.

The PhD thesis however presents only part of his speech and machine-learning activities - while cooperating with Phonexia, he was involved in sentiment detection from ASR transcripts, he integrated a prototype for analyzing maritime communications including ASR, language identification and diarization, and, in the last period, he significantly contributed to the TACR-sponsored project DeePsy (“Deep learning in psychotherapy: Machine learning applied on therapeutic session recordings”) where speech data mining at various levels should help the psychotherapists in better helping their patients.

He has an excellent publication track - during his PhD, he was the author or co-author of more than 30 papers in international conferences and journals. He is the first author of *Analysis of DNN Speech Signal Enhancement for Robust Speaker Recognition* published in *Computer Speech and Language* in 2019, that provides an excellent summary of DNN techniques for pre-processing of speech signal before SV. The paper has already been cited 17 times according to Google Scholar.

Ondrej was also active pedagogically - he taught labs of Signals and Systems (Bc), Speech Signal Processing (Master) and led two successful bachelor theses. He also provided

newcomers in the lab with instruction on tools, data, SV (and other) systems, SGE computing and many others.

From a personal point of view, I appreciate Ondra's sense of responsibility, the right engineering stubbornness and adherence to goals, especially in the difficult period of finishing the thesis.

To conclude, **I fully recommend Ondřej Novotný's Ph.D. thesis for the defense.** I am wishing him all the best in future professional and personal life, and I am looking forward to continuing to cooperate with him.

In Brno, May 25th 2021