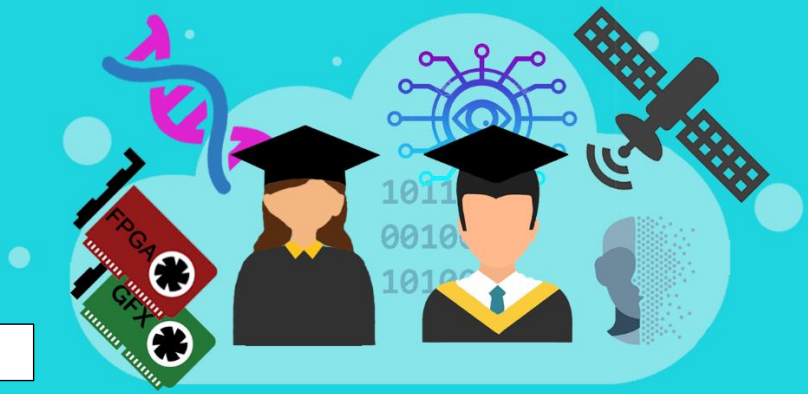


Diploma Thesis

Microprocessors and
Digital Systems
Laboratory

Academic year 2020-2021



DEEP VOCAL AUTOTUNER: Deep Learning based pitch correction for real-time singing performances

Sound and music computing is a research field that studies the whole sound and music communication chain by combining scientific, technological and artistic methodologies that aims at understanding, modeling and generating sound and music through high computational approaches. Additionally, as machine learning is getting more and more popular to applications in digital signal processing and audio engineering, new challenges are emerging that need to be addressed by both industry and research community.

One of the key aspects of this topic is **automatic pitch correction**. Correcting a singer's or an instrument's pitch especially in real time (for the needs of live performances) is a critical task that is not yet efficiently solved. Furthermore, the combination of deep learning and high performance GPU computing promises encouraging results in terms of real time pitch correction.

The student(s) will build a real-time vocal auto-tuner of solo singing performances. Their approach will predict notewise pitch shifts from the relationship between the respective spectrograms of the singing and accompaniment with Deep learning models. GPU accelerator will be used in order to meet the real-time requirements. The final system will be compared with real-world score-free singing auto-tuners.

KEYWORDS: sound and music computing, Deep learning models, High Performance computing

PREREQUISITES: Basic knowledge on Neural Networks, Linux, Scripting (Python, Bash etc.), Basic knowledge of GPUs

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