TECHNISCHE UNIVERSITÄT DRESDEN

ComNets
Deutsche Telekom Chair of Communication Networks

Faculty of Electrical and Computer Engineering Institute of Communication Technology

Student Worker (SHK) Position: Early Decoding and Network Coding for Probabilistic Tasks

We are seeking a highly motivated student to join our research team, focusing on the exciting field of early decoding and network coding. This position is available immediately and can be extended to a Diploma/Master thesis.

About the Project

Traditional codes are deterministic, ensuring a predictable decoding outcome upon completion. However, machine learning inference techniques, which can be seen as decoding a message with respect to a specific aspect (e.g., identifying image content to be a cat) on-the-fly, pose new challenges to our conventional codes. Our research delves into the realm of AI early decoding, seeking to engineer codes capable of exploiting these AI inference techniques with agility akin to early inference methods. The concept of early decoding involves the reconstruction of encoded data before the entirety of information about a transmitted entity (e.g., images, audio, etc.) has been received. The idea is to design codecs made for AI-inference techniques where the goal is to increase the inference certainty as a function of the number of bits received. This approach offers the potential for faster processing and analysis, enabling real-time applications even with incomplete data streams. The primary objective of this thesis is to investigate methods of organizing and binning image data into data chunks, facilitating an early decoding approach for AI systems. In case of packet erasures, network coding techniques can also help. The aim is to develop strategies that optimize the coding process, ensuring that the AI inference system can have a certainty level above a threshold minimizing the transmitted data.

Responsibilities

- Implement different ways of partitioning and ordering the sequence of transmitted image data.
- Compare different approaches using various metrics.
- Work closely with the research team to develop and test new methods.

Qualifications

- Currently enrolled in a relevant degree program.
- Basic knowledge of Python and Image Processing.
- Interest in machine learning, coding theory, and computer vision is a plus.

If you want to join our team and contribute to this innovative research, please apply with your CV and a brief statement of interest to jonas.schulz2@tu-dresden.de. We look forward to hearing from you.