Chair of Imaging and Computer Vision

RWTH AACHEN UNIVERSITY

Bachelor's or Master's Thesis

Compression of PET-Data

Univ.-Prof. Dr.-Ing. Volkmar Schulz
Lehrstuhlinhaber

Tim Claßen and Jan Schneider
Wissenschaftliche Mitarbeiter

Raum 110 / 111
Kopernikusstr. 16
52074 Aachen

Telefon: +49 241 80-22904
classen@lfb.rwth-aachen.de
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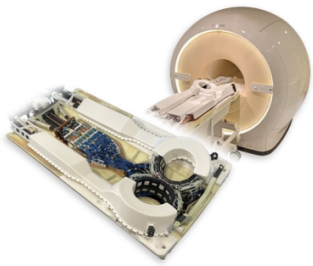
Background

Positron emission tomography (PET) is an imaging technique widely used in oncology for tumor diagnosis. It involves injecting functional tracers that emit positrons during radioactive decay, resulting in high-energy gamma photons detected by surrounding sensors. The detection process generates lines-of-response (LORs) that help reconstruct tracer distribution in the body, with time-of-flight information enhancing image precision.

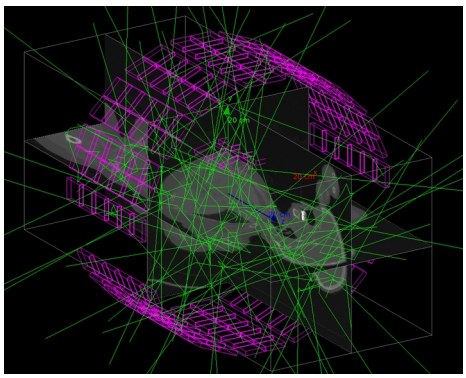
Positron emission tomography (PET) scans produce large volumes of data, which can pose challenges for storage and transmission. However, PET data often contains redundancies that can be effectively leveraged by compression algorithms to minimize the required storage space. The objective of this thesis is to identify these redundancies within PET data and develop compression algorithms that not only reduce data size but also ensure quick access to the information. Consequently, it is essential that the developed algorithms maintain low complexity to facilitate efficient implementation and usability.



Clinical PET-Scanner

Tasks

- Explore PET data formats and how PET scans work
- Explore different compression algorithms and their applicability to PET data
- Apply compression algorithms to PET data and evaluate the developed methods in terms of compression efficiency and complexity



Visual representation of a PET system. Green lines represent coincidences and purple blocks are detectors

Your Profile

We are seeking a motivated student to join our research team for a thesis focused on the intersection of signal processing, positron emission tomography (PET) systems, and data compression techniques. The ideal candidate should possess a solid foundation in signal processing principles and demonstrate an interest in medical imaging technologies, particularly PET.

Our Offer

Our institute features a cluster with 2000 CPU cores and 100 GPUs. We have more than 12TB of RAM and 1TB of VRAM available for computationally demanding tasks.