

Research Project

Name of Institution and department: Department of Radiology, LMU University

Hospital

Link to website: <https://www.lmu-klinikum.de/radiologie>

City and Country of Institution: Munich, Germany

RESEARCH GROUP

Brief description of the research group and of its mission: The Department of Radiology of LMU University Hospital Munich pursues a clearly defined scientific strategy, which aims in particular to develop a foundation for integrated diagnostics.

Integrated diagnostics refers to the collection of a comprehensive data set from clinical, radiological, laboratory chemistry and histopathological examinations. This data set is analyzed using intelligent, self-learning algorithms to enable optimal therapy decisions in the sense of personalized medicine. The strategic pillars of the department strategy include the cell and small animal laboratory, the interventional, minimally invasive, image-guided therapy, the radiological including molecular imaging, and clinical data science including artificial intelligence. The goal of each individual research initiative in radiology is to link individual or all strategic pillars, with the aim of personalizing and perfecting a diagnostic-controlled therapy. The strategy is practice- and application-oriented and aims to enable the translation of new developments into clinical care within a few years on the basis of detailed validation studies through cooperation with cooperation partners and the use of funding instruments.

TITLE OF PROPOSED RESEARCH PROJECT

Lynx: A Unified Foundation Model for Multimodal Radiology — Development and Validation Using Retrospective Clinical Imaging Data

OBJECTIVES

1. To develop a unified multimodal foundation model (Lynx) that can process radiological imaging data across CT, MRI, PET, X-ray, and ultrasound modalities using a shared discrete token vocabulary and a single autoregressive transformer architecture.
2. To evaluate whether the trained model can generate clinically accurate free-text radiology reports from imaging data, as measured by established natural language generation metrics and radiological accuracy assessments.

3. To assess the model's ability to perform automated whole-body anatomical segmentation across 105 structures from volumetric imaging data (CT, MRI, PET), achieving segmentation accuracy comparable to established task-specific methods.

APPLICANT'S DUTIES

- Support in the data curation and standardization
- Support in generating reference standards
- Validating the results of the AI foundation model

APPLICANT'S BENEFITS

- Participation on scientific outcomes of the project i.e. presentations to congresses or publications of papers
- Project Leader: Prof. Dr. Clemens Cyran
- Members: Prof. Dr. Lalith Sundar