

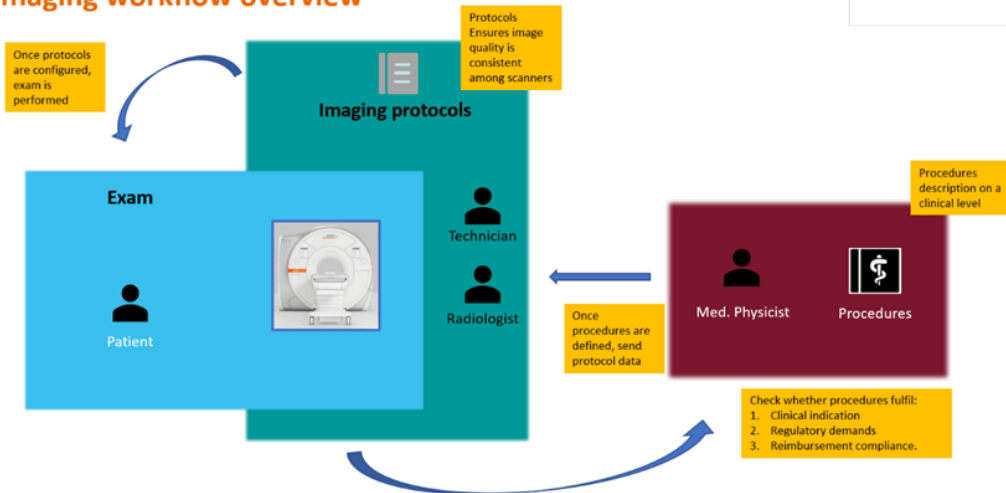
Deriving procedure definitions from examination data by means of machine-learning

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Motivation: Procedure definitions/descriptions for medical imaging form the basis for standardization in clinical practice [1]. However, creation and maintenance of procedure definitions is a tedious task and especially keeping them aligned with the actual scan protocols at the devices is challenging. Also, a checking of the performed exam data against the definitions would be a worthwhile activity.

To ease the above topics we are aiming to create an application that extracts procedure information (e.g., MR Abdominal walls, etc.) from examination data and protocol data (when available) with that, stepping up towards standardization and detection of deviations in medical imaging procedures. The following diagram represents the typical workflow of medical imaging following a medical routine examination.

Imaging workflow overview



The main objective of this thesis is to create an algorithm that extracts the procedure information from the PACS or, if available, from the protocol data. The information shall be represented on in a clinical level (SOP, Protocol book...) to propose a solution able to provide a pre-loaded procedure book, identify deviations from standard imaging procedures, facilitate homogeneity and best practice sharing across devices from different vendors and even check compliance with regulations and insurance companies.

The following is an overview of the tasks involved in the development of the project:

1. Data exploration and processing: Extraction of headers, RDSL information, DMWL, and Images from DICOM Data
2. Data analysis: procedure derivation: Development of a ML model, e.g., deep learning or process mining [2]
3. Apply performance evaluation metrics
4. Perform quality testing

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References

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- [2] W. van der Aalst and et al., “Process mining manifesto,” in *Business Process Management Workshops*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2012, pp. 169–194.