QuantImage v2: an Open-Source and Web-Based Integrated Platform for Clinical Radiomics Research
R. Schaer, V. Oreiller, O. Aidonopoulos, John O. Prior, A. Depeursinge

Purpose: Radiomics models are expected to revolutionize the use of imaging for personalized medicine, but there is currently a lack of integrated solutions allowing radiologists and nuclear medicine physicians to easily create cohorts of patients, extract and manage collections of radiomics features as well as validating them with machine learning models (e.g. classification, survival). We developed a fully open source web-based platform allowing physicians with no advanced knowledge of programming or machine learning to explore & validate state-of-the-art image biomarkers for specific diagnostic or prognostic clinical tasks.

Methods and Materials: The developed solution combined two main aspects: data management & data processing/analysis. A pre-existing open-source web-based tool (Kheops) was used to provide DICOM image storage, management & sharing functionality. On top of this, we developed a companion web platform (QuantImage v2) to allow radiomics feature extraction & management, predictive model building & validation and data visualization.

Results: The platform allowed preparing a patient cohort using Kheops, then using QuantImage v2 to extract radiomics features. Users could then create, visualize and store curated feature collections, including filtering by imaging modality, region-of-interest & groups of features (e.g. intensity, shape, texture). Finally, it enabled the initialization, training and validation of predictive models for both classification tasks (including various algorithms such as linear regression or random forests) and survival analysis using Cox models.

Conclusion: The developed Quantimage v2 platform allows clinical researchers with no programming background to rapidly investigate the relevance of radiomics models in a novel application context. A first version was deployed on the university's infrastructure, as well as inside a university hospital to allow physicians to test it and provide feedback about the usability and performance of the platform.