Abstract #21766

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Title
HEad and neCK TumOR segmentation and outcome prediction: The HECKTOR challenge

Preferred Presentation Format
Late-Breaking Oral Presentation

Topic
Head and Neck

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Body

Purpose or Learning Objective
Automatic segmentation and radiomics on 2-[18F]fluoro-2-deoxyglucose Positron Emission Tomography (FDG-PET) / Computed Tomography (CT) images and clinical data can contribute in optimizing patient management for head and neck cancer. We present the outcomes after the first two editions (2020/2021) of the HECKTOR-MICCAI challenge and discuss the future goals.

Methods or Background
We collected FDG-PET/CT images with clinical data from 5/6 centers in 2020/2021, totaling 254/325 cases. Primary tumors were delineated by experts according to established guidelines. The HECKTOR challenge was organized at the MICCAI 2020 and 2021 conferences to evaluate algorithms on tumor segmentation and prediction of Progression-Free Survival (PFS).

Results or Findings
Simple, well-designed ensembles of 3D U-Nets obtained the best segmentation results (Dice coefficient of 0.76/0.78). PET images contained the most predictive information with the tumor metabolic uptake acting as tumor detection. In association with CT providing additional tissue characteristics, multi-modal models provided the best results. Some nodal metastases were hard to differentiate from primary tumors. A high inter-algorithm agreement was obtained, with some cases incorrectly segmented by all algorithms.
For the PFS prediction, approaches relying on deep learning and/or standard radiomics were proposed. Best performance (C-index of 0.72) was achieved without using the expert contours.

Conclusion
The growing interest in the challenge is matched by the growth of the consortium and dataset. We conducted various post-challenge analyses, leading the path for new challenge designs and tasks. The challenge will be organized in 2022 with more than 1000 cases.

Limitations
The gold-standard segmentation used in this study was expert manual annotation on the PET/CT fusion image without contrast. This can lead to errors and could explain the saturation in segmentation results.

Ethics committee approval

Obtained for all collected data.

Multicategories

Area of Interest
Head and neck

Imaging Technique
PET-CT

Procedure
Chemotherapy, Radiation therapy / Oncology, Surgery

Special Focus
Cancer

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Final Presentation Format
Research Presentation