Optimization of prostate cancer diagnosis using deep learning techniques to reduce false positives in PET with 18F-PSMA and 68Ga-PSMA (preliminary studies).

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Prostate cancer is a leading cause of male mortality. The introduction of radiopharmaceuticals like 68Ga-PSMA and F18-PSMA has significantly improved metastasis detection. However, F18-PSMA shows a 22% higher false positive rate than 68Ga-PSMA, highlighting the need for advanced tools to improve diagnostic accuracy. In this context, deep learning offers promising support in distinguishing true metastases from false positives. We tested nnUNet, a self-contouring deep learning model, to distinguish true metastases from false positives in F18-PSMA PET/CT scans. A dataset of 27 PET-CT scans (4 for testing) was used. nnUNet was chosen for its adaptability to various segmentation tasks, thanks to its automated normalization and preprocessing pipeline. Training focused on auto-segmentation of metastatic lesions to reduce operator-dependent variability. Despite the limited dataset, nnUNet showed promising accuracy in segmenting lesions and reducing false positives. These findings suggest strong potential for AI in improving F18-PSMA PET imaging and support further validation on larger datasets.

THAIS Project – Thero AI System: A comprehensive non-anthropomorfic AI.

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As predicted by the American visionary scientist John McCarthy in 1956, Artificial Intelligence is directed, in all its forms and developments (generative and predictive AI), to simulate human intelligence, imitating its creativity to make an important contribution to all human activities, in terms of time and productivity. This distinctly anthropomorphic design can also represent its limit because AI learns and develops its processes flowing almost every human activity, sometimes grasping prejudices, which can possibly amplify existing distortions, prejudices or inequalities ("algorithmic bias"). More worrying, however, is what results from an analysis of many algorithms: too often they do not understand nature and the environment, if not from a human utilitarian point of view. Here, too, it is an anthropomorphic drift because it reflects human alienation from nature and the environment. For this reason, the THAIS project intends to propose a non-anthropomorphic mathematical workspace more suitable for understanding nature and the environment —regardless of their utilitarian value— to face new global challenges, from pandemics to climate change.