Docket #: S21-255

Automated generation of computed tomography (CT) perfusion parametric maps

Researchers at Stanford have developed a computational system to robustly generate quantitative perfusion parametric maps automatically from computed tomography (CT) or magnetic resonance (MR) perfusion images. Current methods by manually or automatically selecting regions of images lead to high-variance or noisy perfusion maps that may be unreliable for detecting abnormal blood flow in the brain. The invention enables reliable automated generation of perfusion maps, using a supervised deep learning algorithm, that takes 3D CT perfusion images as an input and returns time-resolved perfusion maps. The invention is comprised of a neural net trained to reduce image artifacts, deep learning of temporal information embedded in the images, and deep learning of spatial distribution of image features. The inventors show that their algorithm predicts properties of brain tissues from CT perfusion data with similar performance comparable to conventional automated methods.

Stage of Development

The authors demonstrate that the invention generated examples of perfusion maps with similar performance when compared to FDA imaging software conventionally used in landmark clinical trials.

Applications

- Image analysis of CT or magnetic resonance (MR) perfusion images for the detection of:
    - Cerebrovascular disorders: stroke, vascular malformations
    - Hypo-perfusion disorders: post-radiation necrosis

    - Hyper-perfusion disorders: brain tumor or metastases, inflammation, infection
    - Detecting changes in the brain associated with seizure

Advantages

- Decreases variations in perfusion parametric maps generated from manual inspection
- Region-selection process is more reliable than current automated approaches
- Adaptable to any hardware or software, including real-time processes
- Requires fewer CT image samples, decreasing patient exposure to radiation
- Cheaper than conventionally used software

Patents

- Published Application: WO2023081917

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