

CPH Seminar in Precision Medicine

Representation learning of 3D brain angiograms, an application for stroke research

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Stroke occurs when the blood supply to the brain is disrupted suddenly. The fifth leading cause of death is stroke in the United States, and it is a major cause of disability among adult population. A subarachnoid hemorrhage (SAH) is a type of stroke often caused by a spontaneous rupture of cerebral aneurysm if not a result of a trauma. The cause of cerebral aneurysms is not known. Among SAH patients who survive the aneurysm rupture, about 30% gets delayed cerebral ischemia (DCI) that leads to major problems and decreased quality of life.

We aim to find computational biomarkers based on the 3D angiogram images obtained from SAH patients admitted to the Memorial Hermann Hospital. Our overarching goal is to find biomarkers for delayed cerebral ischemia that occurs 30% of the time after subarachnoid hemorrhage. We started training different classifiers to predict several variables that might affect the DCI development. Having such biomarkers would help the physicians to treat patients under high(er) risk for DCI to prevent it from occurring. Furthermore, hospitals could potentially offer the ICU beds available to patients who need it more than the reduced DCI-risk patients. In this talk, we will present our initial approach to learn a brain vasculature using dictionary learning and use it as a predictive model for measurements crucial for SAH patients admitted for hospital stay.

Friday, January 19, 2018. 12p – 1p. UCT.1414

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