CISC 499 Projects

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Project 3: Statistical Shape Model of the Lumbar Spine

Spinal pain is one of the most commonly reported forms of discomfort in the workforce. Spinal injection of drugs has been a safe and efficient method for managing this pain. Currently this procedure is performed under Computed Tomography (CT) and fluoroscopy guidance in hospitals with often long wait times. The Med-I, and Perk laboratories are interested to develop a spinal pain management procedure, such as nerve blocks and facet joint injections, available in an office setup, under ultrasound guidance. For this purpose, and to accurately guide needles in the spinal column, there is a need to build advanced ultrasound imaging processing techniques along with robust methods for registration of 2D ultrasound images to 3D volumes.

Anatomical atlases are commonly used in computer-assisted surgery and therapy to introduce prior anatomical knowledge in automated or semi-automated image analysis algorithms. For this project we are interested in testing an already developed statistical atlas of the lumbar spine. The spine atlas is comprised of several separate objects (the vertebrae) and has been created from CT data of 40 patients. The aim of the project will be to test the robustness of the atlas with respect to the parameters that were used when building it. This atlas will be later used in the spinal pain management project for accurate guidance of needle in the spinal column.