

Probabilistic tractography approach for brain connectivity analysis

Program: Ph.D. in Engineering

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Project Description:

The development of new medical imaging technologies, like diffusion tensor imaging (DTI), has opened the door to a multitude of important applications in medicine. Among these applications, tractography has had a significant impact on the field of neurology, allowing scientists to analyze and visualize the connectivity of regions in the brain. While tractography has already contributed to important advancements in this field, many challenges remain, such as the high computational costs and the difficulty of dealing with crossing fibers.

The goal of this project is to develop new probabilistic methods for tractography that will enable more precise analyses than existing methods. To find the connection probabilities efficiently, these methods will use techniques based on random walks and manifold embedding. Also, to avoid the problem of crossing fibers, the proposed methods will integrate information on the direction of fibers. The accuracy and efficiency of the methods will be evaluated on various DTI datasets.

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