

## Research Internship 2013

### Modelling of deep brain stimulation effects using statistical analysis

#### Supervision:

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Keywords: Statistical analysis, data-mining, mathematical models, neurosurgery

#### **Context**

High frequency Deep Brain Stimulation (DBS) has been demonstrated as an efficient minimally invasive surgical treatment for treating Parkinson or motor related diseases and recently severe neuropsychological diseases. Deep brain structures are stimulated using electrodes anchor to the skull that allows decreasing motor symptoms. In Rennes, more than 200 patients have been implanted over the last 5 years, demonstrating the importance of this procedure for Parkinsonian patients. However, the exact deep brain structures that have to be targeted remains not well defined, and efforts have to be put into research for understanding the different phenomena and adverse-events that have been observed on patients after surgery.

#### **Internship focus**

Each patient implanted in Rennes underwent many medical images before and after the surgery, as well as a panel of clinical test (related to motor, neurology, etc...). From images, the exact position of electrodes can be determined post-operatively, and this position can be correlated to the different clinical scores in order to build anatomo-clinical atlases. The idea of this internship is to study different strategies for analyzing populations of patients according to their clinical scores and electrode positions. Data-mining techniques, as well as statistical analysis should be experiment for extracting rules from these atlases and better understanding the phenomena related to DBS surgeries.

#### **Trainee profile**

- Master or engineering curriculum
- Knowledge: Statistical modeling, applied statistics, data-mining
- Programming skills would be of advantage (e.g. C++, Matlab)
- Associated partners: Rennes Neurosurgical department
- English (read, written).

**Duration:** 5 to 6 months starting February 2013. Earnings planned.