“Atlas-Based Cryosection Mouse Segmentation”

PROJECT OVERVIEW

Pre-clinical studies are conducted in order to collect information so that safe human testing can begin. Those are done usually in the fields of medical devices, drug testing (e.g.: for cancer treatment), gene therapy solutions and other product development.

Small animals like mice and rats are extensively used for drug testing on various stages of its development and one way to analyze and monitor the effects of a given drug is to sacrifice the animal on various time-points of the study and perform a traditional histological exam. In order to do that the animal is cryosectioned (sliced, while frozen) and the slices are analyzed under a microscope or on a computer monitor. The clinician then has the very tedious task to distinguish between all organs in order to find the regions of his interest (tumors, metastasis, and other cellular and molecular events).

What we propose, is to develop an algorithm that would allow, using a whole-body articulated mouse/rat atlas, to automatically segment all the organs present in the cryosections, in order to facilitate a very fast and easy browsing through the mouse data and to easily detect tumors or other abnormalities. In order to achieve this, various image processing techniques (like image registration, image segmentation, labeling, etc.) can be applied. See Figure, for a very simplistic illustration of the project.

If the student is interested, this project would involve a short practical part, where he/she would participate in the data acquisition process (Cryosectioning).

CONTACTS
- Artem Khmelinskii: a.khmelinskii@lumc.nl
- Martin Baiker: m.baiker@lumc.nl
- Boudewijn P. F. Lelieveldt: b.p.f.lelieveldt@lumc.nl

www.lkeb.nl

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