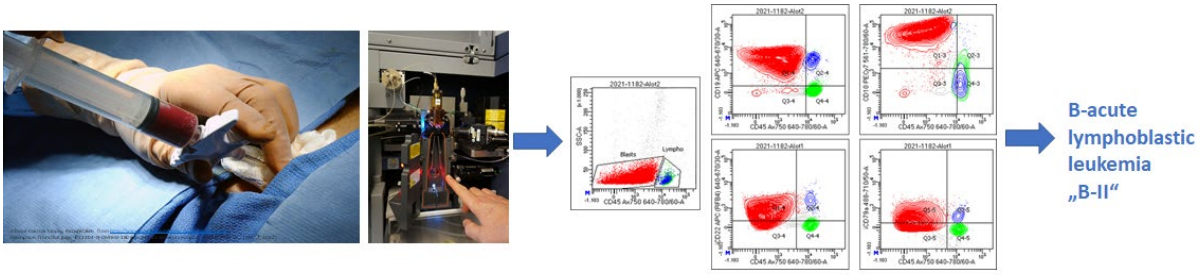
IMMUNOPHENOTYPING FOR DIAGNOSIS IN CHILDHOOD LEUKEMIA



Supervisory Team[1]

Primary Supervisor:

Robert Sablatnig, Institute of Visual Computing and Human-Centered Technology

TU Wien project partners:

Martina Marchetti-Deschmann, Institute of Chemical Technologies and Analytics; Oliver Guillaume, Institute of Materials Science and Technology

External academic partners: *Name and affiliation*

External industry partners:

Michael N. Dworzak, Labdia GmbH.

Project Description (max 180 words)

This PhD project focuses on improving the treatment of children with acute leukemia using machine learning technology. More specifically, it targets an important step of diagnosis and management of childhood leukemia, which is immunophenotyping by multicolor flow cytometry (MFC). MFC measures 10-30 descriptive features (granularity, different antigen expressions) of several hundred thousand up to millions of cells of a bone marrow sample. The resulting data space holds several cell populations with complex distributions. Clinicians search for patterns of the cell populations in order to determine the phenotype.

Immunophenotyping is able to discriminate between the main different acute leukemia subtypes such as B-cell or T-cell lymphoblastic leukemia or myeloid leukemia as well as between special leukemia cases such as bi-lineal cases or leukemias with sub-clone formation.

Specific immunophenotypes can also be suggestive of recurrent genetic abnormalities due to the association between genetic aberrations and immunophenotypic patterns.

[1] The Early Stage Researchers (ESRs) will be accompanied during their thesis by an individual “Thesis Advisory Committee” (TAC), which will guide the ESR through the graduate studies. The TAC will consist of the thesis primary supervisor, and two additional members of the Supervisory Team selected by the ESR.

Key Goals and Tasks

The primary aim of this PhD thesis is the development of a computational method based on machine learning for fully automatic analysis of MFC-immunophenotyping data for reliable and objective delineation of the different leukemia subtypes. Such methods also have the potential of identifying unknown (rare) leukemia subtypes especially when combined with genetic information. Eventually this will improve the diagnosis and treatment of childhood acute leukemia.

Project-specific Requirements

- Completed master studies in computer science or biomedical engineering.
- Knowledge on statistics and machine learning.
- Experience and skills in using programming frameworks for deep learning.
- Enthusiasm for biomedical research.
- Affinity for Bayesian methods.
- Willingness to travel to project meetings and scientific conferences.
- Excellent English language skills in scientific field.
- Personal skills: ability to work in a team, communication, persistence.