



Thesis Project Form

Title (tentative): Unsupervised machine learning for Chronic Lymphocytic Leukaemia patients' stratification

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Description

Motivation and application domain

Chronic Lymphocytic Leukemia (CLL) is a complex disease with diverse clinical outcomes. Traditional stratification methods may overlook key patterns in patient data. This project, in collaboration with Prof. Mazzarello from the DIMES department, aims to apply unsupervised machine learning to real-world CLL datasets. By identifying hidden patient subgroups, we aim to improve personalized treatment strategies and contribute to precision medicine.

General objectives and main activities

Preprocess real-world CLL data.
Apply unsupervised learning to identify patient subgroups.
Validate the clusters and assess clinical relevance.
Develop visualizations for easier interpretation.

The main activities of the project will focus on expanding an existing data exploration pipeline to build a robust and reproducible machine learning workflow. This will involve optimizing preprocessing steps, improving the application of clustering algorithms, and ensuring that the pipeline can be easily adapted and scaled for various data inputs and clinical use cases. The goal is to create a seamless, reliable framework that consistently produces meaningful insights into CLL patient stratification.

Training Objectives (technical/analytical tools, experimental methodologies)

Gain proficiency in unsupervised machine learning techniques.
Learn advanced data preprocessing and feature engineering methods.
Develop skills in building reproducible machine learning pipelines.
Master clustering validation and interpretation techniques.
Enhance abilities in data visualization for clinical insights.
Improve Python programming abilities

Place(s) where the thesis work will be carried out: MaLGa center

Additional information

Maximum number of students: 1