Developing a Graphical User Interface for a Python-based Flow cytometry Data Analysis and Classification tool

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Background. Flow cytometry (FC) is a laboratory technique used to detect and measure physical and chemical characteristics of population of cells or particles in a solution. In medicine, particularly in hematology and immunology, flow cytometry is mainly applied to characterize and count types of white blood cells in the evaluation of infectious diseases, autoimmune disorders, immunodeficiencies, or in the diagnosis of blood cancers such as leukemias or lymphomas. [Bini et al., 2024] The development of methods for automating and aiding with the analysis of FC data can thus be of great interest to researchers and practitioners in the field of medicine.

Project outline. For our newly developed Python tool for analyzing and classifying FC data, usability is crucial. For it to be accessible to researchers and practitioners outside of the field of bio-informatics the development of an easy to use graphical user interface (GUI) is necessary. The project would proceed as follows:

- Assessment of necessary functionality and features for high usability.

- Assessment of which GUI architecture best fits our use case (e.g. standalone desktop application, server-hosted web app, . . .)

- Development of the GUI

- Testing and deployment

Goal. A GUI that makes our Python tool easily available. The following features should be included:

- Availability across platforms

- Easy data input and output

- Easy extraction of trained models

- More to be discussed during the course of the project . . .

Requirements.
- Python programming

- Experience in web development and GUI development

- Independent and rigorous work-style

References

L. Bini, F. Nassajian Mojarrad, M. Liarou, T. Matthes, and S. Marchand-Maillet. Flowcyt: A comparative study of deep learning approaches for multi-class classification in flow cytometry. In *Conference on Health, Inference, and Learning (CHIL)*, 2024.