Web framework for Systemic Lupus Erythematosus (SLE) project using Flask

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Background information

- Systemic Lupus Erythematous (SLE) is a very rare autoimmune diseases with heterogeneous symptoms and needs **differential diagnostic**
- Therefore, **interdisciplinary research** is necessary and **different information** are collected for the cohort in Lund[1], e.g. blood samples, MRI abnormalities and cognitive tests
- Different radiologists, rheumatologists, psychologists and researchers are working with these dataset

==> Need for a central “database” to store, filter and receive data

1 https://portal.research.lu.se/portal/en/projects/advanced-mri-in-sle-and-correlation-to-cognitive-function(ed329e2c-cd39-48a9-9f92-4a60f840cbbb).html

Material and Methods I

Goal: every collaborator should have access to the dataset by filtering information and receive an output (csv-file).

First approach: instead of a real database, a manually curated csv-file saves all the information

Features:
- Login: only collaborators have access
- Queries: search only for that information that is of interest
- Control: results of the csv-file queries
- Output: download the selected queries in a csv-file

Material and Methods II

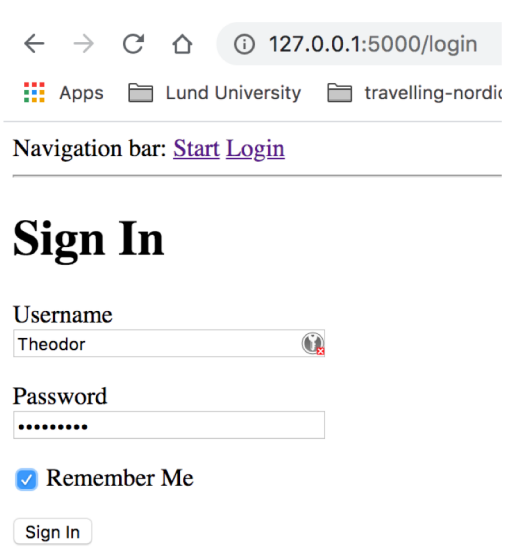
=> Software packages used:

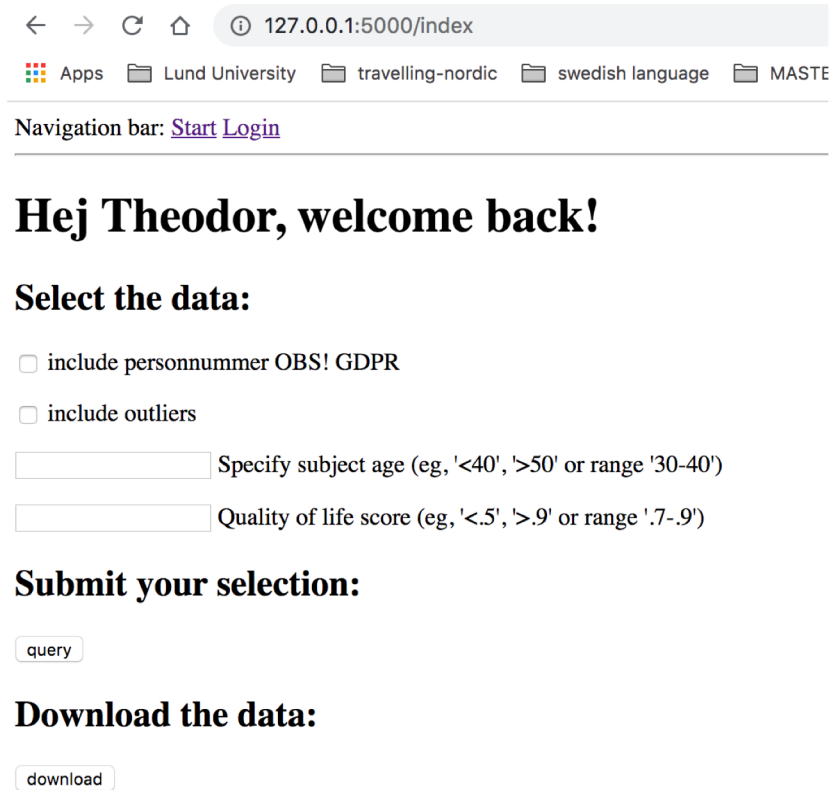
- *Python/Flask*: framework to integrate python code in web browser
- *WTForms*: webforms and fields
- *Jinjia2*: used to customize filters and texts

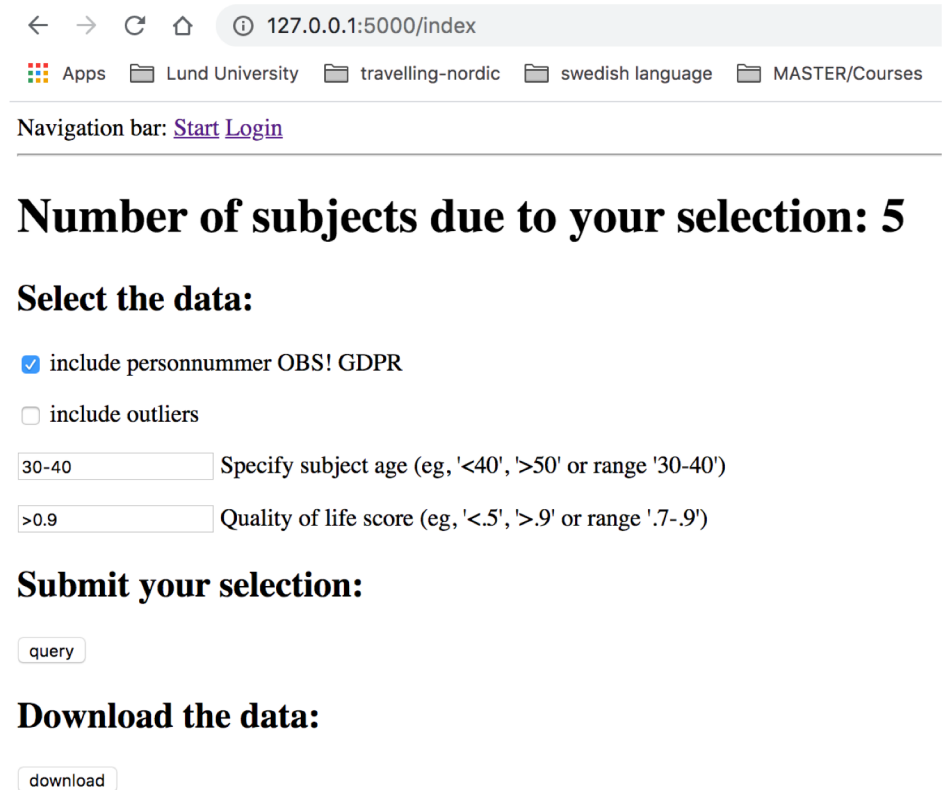
=> Tested for simple queries

=> Tested for invalid input

	id	mri_date	outlier	comment	pat_age	label	CNS_date	CNS_time	durationsickness	sdi_score	sledai2k_score	FSS_score	MADRS_score	HADS_score	QoL_eq5d	sn
44	SLE_48	2014-05-23	0	Excluded from björns manuscript because of missing FreeSurfer data (data found!)	35	NPSLE	2014-03-14	AM		0.0	4.0				1.0	0.
46	SLE_52	2014-06-19	0		34	NPSLE	2015-10-08	AM	6.0	0.0	0.0	51.0	9.0	3.0	1.0	0.
47	SLE_53	2014-09-11	0		32	NPSLE	2015-02-19	AM	16.0	0.0	0.0	21.0	0.0	1.0	1.0	0.
49	SLE_55	2014-11-06	0		35	NPSLE			5.0	0.0	2.0	19.0	3.0	1.0	1.0	0.
52	SLE_58	2014-12-05	0	Several cogn. sub-tests missing	32	NPSLE	2015-04-09	AM	8.0	0.0	0.0	42.0	4.0	2.0	1.0	0.



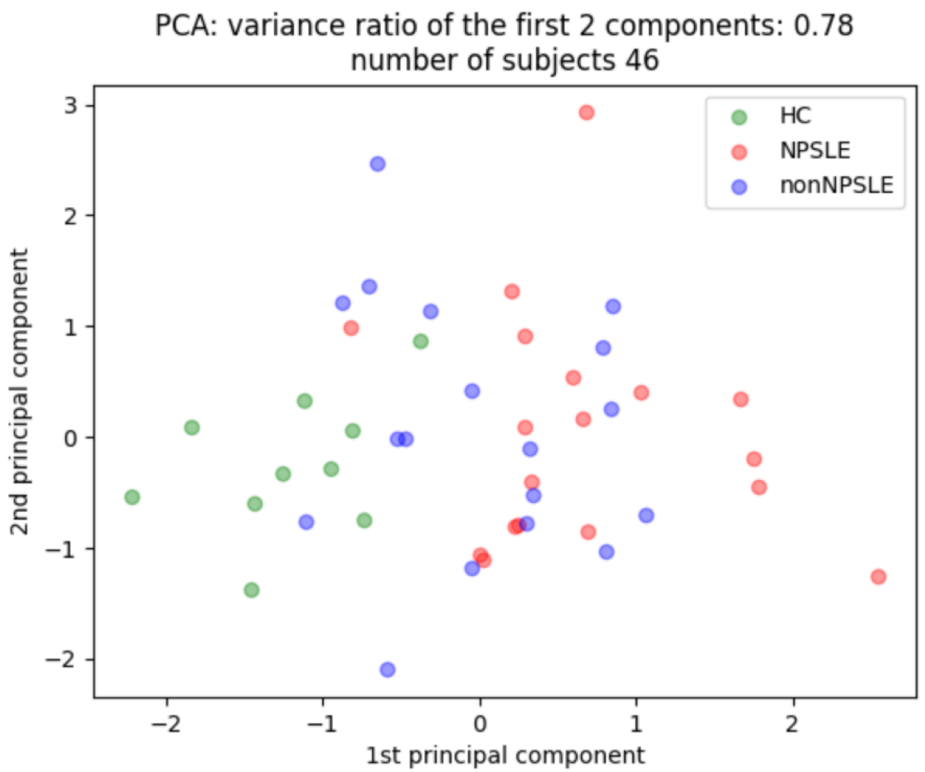




Results II

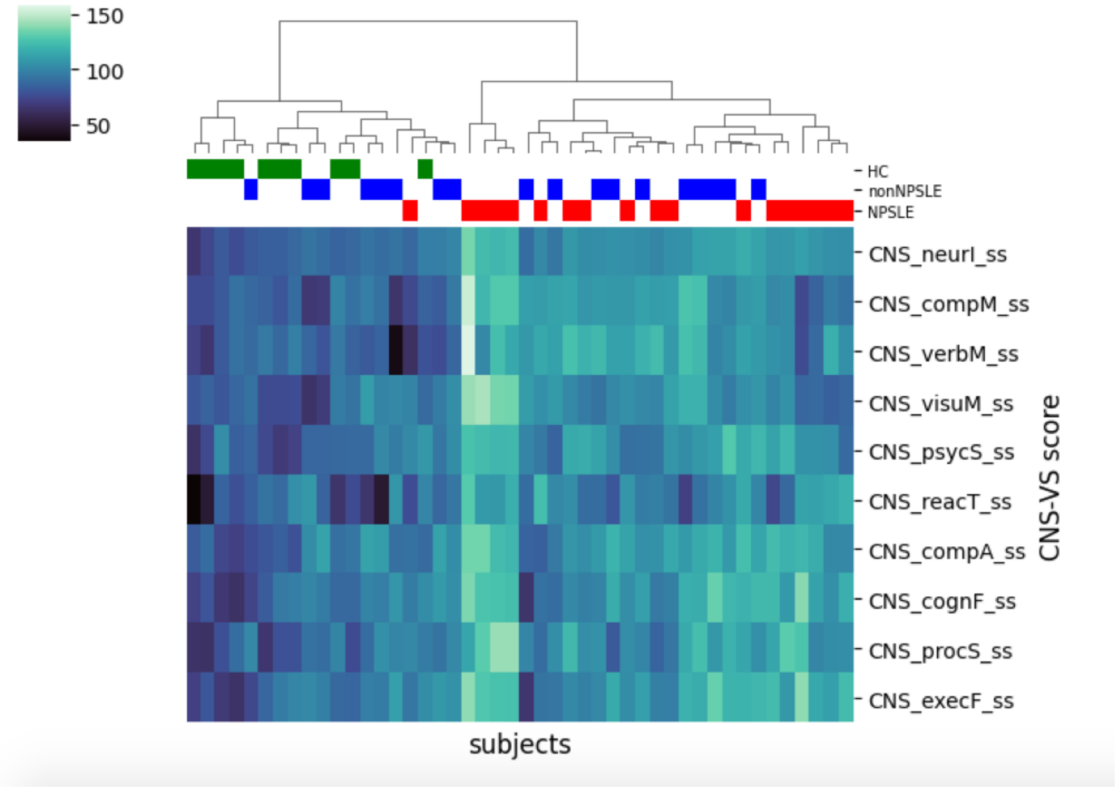
Principal Component Analysis (PCA) on CNS-VS standard scores:

show pca



Clustering (hierarchical ward) on CNS-VS standard scores:

show clustering



Discussion

+ user login (collaborators only)
+ filtering using webforms + status update (number of subjects)
+ output as csv-file
+ PCA and Cluster analysis

- no real users database implemented yet
- just few filters applied
- relational database instead of csv-file

Outlook

=> First approach to handle the data and queries

=> Flask is

… easy to install and implement
BUT
… requires knowledge of different languages and packages (!)
… just a development server
… later real productive environment