



Master of Science – Biomedical Engineering  
Thesis Proposal

### Implementation in an R-package of the lung function fluctuations based clustering algorithm

It is increasingly recognized that fluctuations in physiological parameters and disease biomarkers reflect important dynamic aspects of physiological and pathophysiological processes. We recently developed an algorithm that groups healthy patients and those with airway diseases, such as asthma and COPD, in different clusters according to the fluctuation patterns in each patient's lung function parameters recorded over a sufficiently long time period. More details can be found in our publication <https://thorax.bmj.com/content/73/2/107.abstract>.

The goal of this approach is to provide patients with more specific diagnoses and thereby pave the way towards personalized treatments. In order to make this method available to the research community, we are interested in efficiently implementing the algorithm in the statistics and programming language R as an R-package. Only very basic knowledge of R is required for this project, as one of the goals of the MA thesis is for the student to learn how to program in R and how to create and deploy R-packages.

#### Nature of the Thesis

Experimental: 0%  
Programming: 80%  
Documentation: 20%

#### Specific Requirements

Basic programming in R.

#### Supervisor

Dr. Edgar Delgado-Eckert, DBE and University Children's Hospital (UKBB)

<https://dbe.unibas.ch/en/research/imaging-modelling-diagnosis/computational-physiology-and-biostatistics/>

#### Contact

Dr. Edgar Delgado-Eckert: [edgar.delgado-eckert@unibas.ch](mailto:edgar.delgado-eckert@unibas.ch)

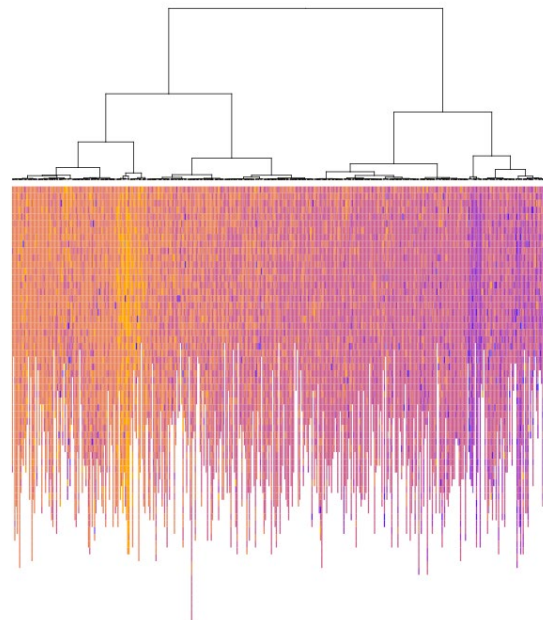


Figure 1: Clustering of time series of lung function measurements (colour coded) obtained using Fluctuations Based Clustering. Each time series corresponds to one patient (<https://thorax.bmj.com/content/73/2/107.abstract>).