

TITLE: Personalized Health Care

Description

This lab will give an overview about the use of data from a national survey to investigate the relationship among variables related to the inflammation process (such as C-reactive protein, number of lymphocytes, number of neutrophils, mean platelet volume) and lifestyle variables such as dietary habits and physical activity. The goals are: to develop an inflammatory index, to identify lifestyle profiles and to use such profiles as possible risk factors for severe inflammation status. To such end, multivariate machine learning techniques will be applied.

Duration

20 hours (5 slots of 4 hours)

Calendar (tentative) 1430 – 1830:

24-27-31 may; 7-9 june

Where:

Polo Vialba, in Via Giovanni Battista Grassi, 74, 20157 Milano, presso l'Ospedale Sacco.

Main Content

- Develop indices and profiles according to your preferred algorithm among PCA (linear PCA and extensions) and clustering techniques (e.g. hierarchical clustering, consensus clustering) based on big survey data.
 - Assess the accuracy of the clustering method, for identifying the number of clusters and for assigning each subject to the clusters.
 - Assess the association among lifestyle clusters and the inflammation index by suitable multivariable regression modeling methods.
 - Use related R packages, such as FactoMineR, PMA and ml3.
- Students will work in groups. Each group will do a final presentation of the developed approach and of the results obtained.

References:

- <https://mlr3book.mlr-org.com>
- Husson F., Lê S., Pagès J. (2017). *Exploratory Multivariate Analysis by Example Using R*. 2nd edition. Chapman & Hall/CRC.
- Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani. *An Introduction to Statistical Learning: with Applications in R*. New York :Springer, 2013.
- Zou, H., Hastie, T., & Tibshirani, R. (2006). Sparse principal component analysis. *Journal of computational and graphical statistics*, 15(2), 265-286.

Reference for NHANES survey:

<https://www.cdc.gov/nchs/nhanes/index.htm>