**Scheda insegnamento**

**Modulo di “Modelli mistura Gaussiani per il clustering, la classificazione e la stima di densità” / “Gaussian Mixture Models for Model-Based Clustering, Classification and Density Estimation”**

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|  | **Italiano** | **English** |
| **Docente/Instructor** | Luca Scrucca | Luca Scrucca |
| **Titolo/Title** | Modelli mistura Gaussiani per il clustering, la classificazione e la stima di densità | Gaussian Mixture Models for Model-Based Clustering, Classification and Density Estimation |
| **Contenuti/Contents** | ‐ Modelli di misture finite ‐ Modelli mistura Gaussiani  ‐ Modelli per la cluster  analisi basati sulla distribuzione Gaussiana multivariata  ‐ Algoritmo EM ‐ Selezione del modello  ‐ Stima di densità tramite modelli mistura Gaussiani ‐ Classificazione tramite modelli mistura Gaussiani  - Selezione delle variabili ‐ Il pacchetto mclust per R | - Finite mixture models ‐ Gaussian Mixture Models  ‐ Model‐based clustering based on multivariate Gaussian distribution  ‐ EM algorithm  ‐ Model selection  ‐ Density estimation via finite mixture modeling ‐ Classification using Gaussian mixture models  - Variable selection  ‐ The R package mclust |
| **Metodologia/Method** | * Analisi teorica * Discussione di articoli * Discussioni in classe o realizzazione lavori individuali | * Theoretical analysis * Discussion of scientific papers * In class discussion or individual assignments |
| **N. Ore/ N. hours** | **10** | **10** |
| **Mese/Month\*** | **Febbraio/Marzo** | **February/March** |
| **Curriculum** | - QME | - QME |
| **Testi di riferimento/ Suggested readings** | Fraley C., Raftery A. E. (2002) *Model‐based clustering, discriminant analysis, and density estimation*. **JASA**, 97(458), 611-631.  McLachlan G., Peel D. (2000) *Finite Mixture Models*. New York: Wiley.  Scrucca L., Fop. M., Murphy T. B. and Raftery A. E. (2016) mclust 5: clustering, classification and density estimation using Gaussian finite mixture models. *The R Journal*, 8⁄1, 205-233. <https://journal.r-project.org/archive/2016-1/scrucca-fop-murphy-etal.pdf>  Scrucca L. and Raftery A. E. (2018) clustvarsel: A Package Implementing Variable Selection for Gaussian Model-based Clustering in R. *Journal of Statistical Software*, 84(1), pp. 1–28. <http://doi.org/10.18637/jss.v084.i01> | Fraley C., Raftery A. E. (2002) *Model‐based clustering, discriminant analysis, and density estimation*. **JASA**, 97(458), 611-631.  McLachlan G., Peel D. (2000) *Finite Mixture Models*. New York: Wiley.  Scrucca L., Fop. M., Murphy T. B. and Raftery A. E. (2016) mclust 5: clustering, classification and density estimation using Gaussian finite mixture models. *The R Journal*, 8⁄1, 205-233. <https://journal.r-project.org/archive/2016-1/scrucca-fop-murphy-etal.pdf>  Scrucca L. and Raftery A. E. (2018) clustvarsel: A Package Implementing Variable Selection for Gaussian Model-based Clustering in R. *Journal of Statistical Software*, 84(1), pp. 1–28. <http://doi.org/10.18637/jss.v084.i01> |

\* For details, please, refer to the calendar available at <http://dottorato.ec.unipg.it/it/>