

Advanced Probabilistic Machine Learning and Applications

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Tutorial 10: Poisson Matrix Factorization

In this tutorial we will implement the EM and VI algorithms for the Poisson Matrix Factorization model, seen in Lecture 10. We will analyse the *football* dataset, that you can find in the folder **football/football_net.gml**, and in the jupyter notebook it has been already pre-processed. You will also find a **functions.py** script, where you can find some useful functions.

Exercise 1: implementing PMF with EM

We first implement the EM algorithm.

- (a) Complete the functions of the class **PMF_EM**.
- (b) Plot the log-likelihood values.
- (c) Plot the obtained partition, with both overlapping and hard communities. Compare with the ground truth.

Exercise 2: implementing PMF with VI

We now implement the VI algorithm.

- (a) Complete the functions of the class **PMF_VI**. This implies to compute analytically the ELBO before implementing it.
- (b) Plot the elbo values.
- (c) Plot the obtained partition, with both overlapping and hard communities. Compare with the ground truth.