

# Hyper-Parameter Optimization for Latent Spaces in Dynamic Recommender Systems

Bruno Veloso, Luciano Caroprese, Matthias König, Sónia Teixeira,  
Giuseppe Manco, Holger H. Hoos, João Gama  
INESC TEC, CNR, LIACS

## Goal:

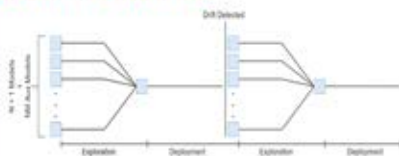
- Our problem deals with Online AutoML in environments where the working conditions change over time.
- The main goal consists of studying online optimization methods for hyper-parameter tuning. In dynamic environments, the “optimal” hyper-parameters might change over time.
- A responsible design (considering the ethical and technological concerns) for a better society.
- This is important to support Europe to lead a new, automated, technological era.

## Recommendation Problem:

- Problem: Make predictions for unseen items
- We use streaming data to train and validate the model using the prequential protocol
- Initial Setup: a simple embedding model

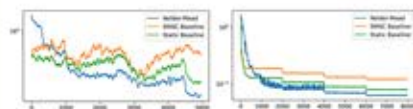


## Online AutoML:



- **Nelder-Mead Algorithm**
  - It uses a set of heuristics to optimize a loss function
  - Starts with random hyperparameter values
  - The stopping criteria uses a distance metric

## Results:



- **Achievements**
  - Outperformed two strong baselines on Movielens dataset (left picture)
  - Outperformed two strong baselines on data generator (right picture)

## Outputs:

- Paper accepted on ECML PKDD 2021
- AutoML prototype for latent spaces in dynamic recommendation systems
- Data Generator prototype