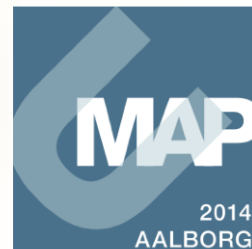# UNDERSTANDING USAGES BY MODELING DIVERSITY OVER TIME

Amaury L'HUILLIER

Sylvain CASTAGNOS

Anne BOYER

RECOMMENDER SYSTEMS

- Current models are very precise [Koren, 2009]

BUT

- Optimization criteria should be different from pure machine learning
  - Netflix : best algorithms had a difference of 0,02 as regards RMSE [Koren, 2009; Sill, 2009, Töscher, 2009]
  - A difference of 10% of precision between 2 algorithms is not perceived by users [Jones, 2010]
  - Taking into account diversity to adapt algorithms and interface (explanations of recommendations, organization of interface) can double the acceptance rate [Zhou, 2009]

THUS

- We aim at analyzing usages (and associated diversity) over time to:
  - Understand implicit context
  - Anticipate events (skipped songs, ends of sessions)
  - Adapt and explain recommendations

DANCE: A TEMPORAL MODEL BASED ON DIVERSITY

Example with music dataset: user's listening sequence
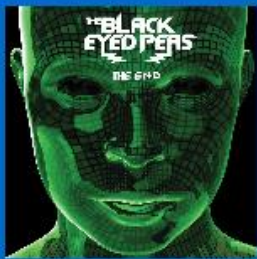
Michael Jackson
Xscape
Pop - R&B
4:04
Energetic
Positive
High hotness
...

Black Eyed Peas
Boom Boom Pow
Electro
5:08
Energetic
Positive
High hotness
...

Kavinsky
Nightcall
Electro
4:16
Energetic
Neutral
High hotness
...

Lana del Rey
Blue Jeans
Rock
3:30
Calm
Dark
Low hotness
...

Lana del Rey
Born to Die
Pop
4:46
Calm
Dark
Low hotness
...

Lana del Rey
Summertime...
Trip Hop
4:25
Calm
Dark
High hotness
...

At each time step, we bring history and target forward.

history   target   t=1

history   target   t=2

history   target   t=3