SCALABLE PERSONALIZED RECOMMENDER SYSTEM

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IIT.SRC 2016

Overview

We propose a flexible hybrid method for personalized recommendations built on a scalable distributed architecture. Our method incorporates aspects of **popularity** and **recency**, resulting into a so called **"trendiness",** while focusing on **context** of user requests, and user **behaviour similarity**. We evaluate our method on a offline data set from Plista ORP and partially online, on the same platform, used in newspaper articles recommendations.

We use the following machine learning algorithms for estimation of the aforementioned properties:

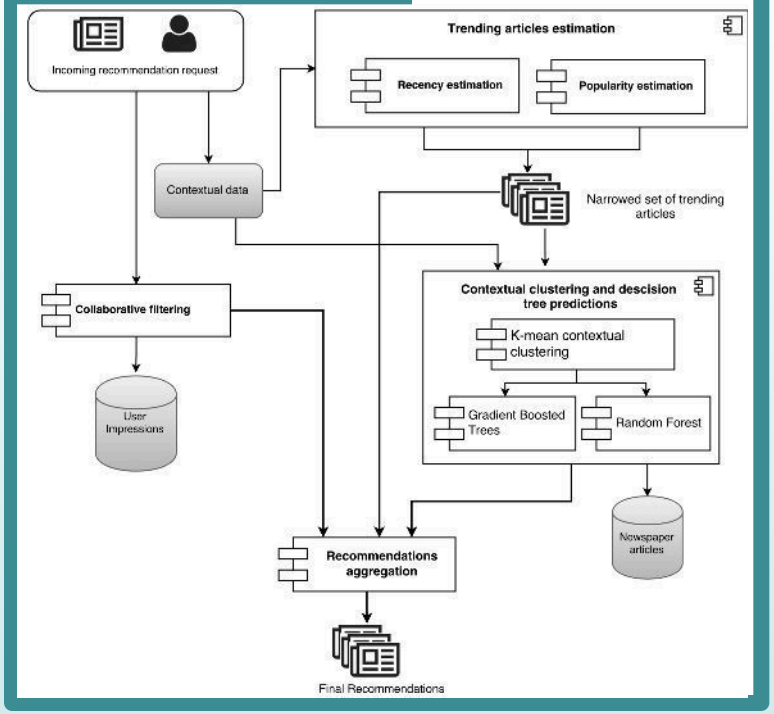
- **Collaborative filtering with ALS**
- **Contextual clustering with K-means**

Motivation

Recommender systems on Web have to provide responses in up to hundreds of ms, while still adapting to the current context of user, categorizing them as (near) real-time systems. Scalability demands force researchers and developers to come up with innovative algorithms for recommendations, in order to provider users with up to date, dynamic recommendations.

Our approach combines multiple inputs, resulting into increased recommendations' accuracy (slightly higher precision), compared with methods used separately, while still scaling as proved in our evaluations.

Recommendation method



Recommendation method

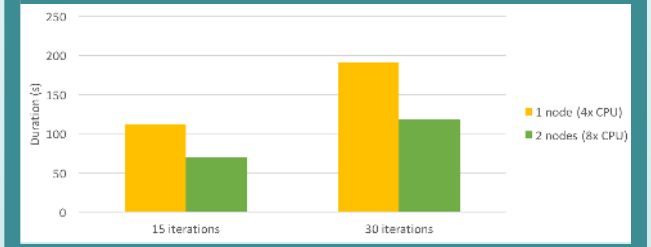
1. Identify user cluster based on user context (time, weather, item categorization, location ..)
2. Find trending items for specific user cluster (using popularity and recency)
3. Rank trending items according to the Random Forest predictor, which is trained per user cluster
4. Get collaborative recommendations using ALS
5. Aggregate recommendations and present them to user (or forward to external system)

Results – Recommendations precision

Method	p@3	*p@5*
ALS	0,03797	0,02514
CTX	0,00122	0,00172
ALS+POP	0,04120	0,03193
CTX+POP	0,00318	0,01270
HYBRID	0,03817	0,02514
HYBRID+POP	**0,04121**	0,03193

- We witnessed fast precision decline with the growing age of machine learned models

ALS scalability 15mil. visits (Apache Spark)



K-means scalability, 480MB (Apache Spark)

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