

UNIVERSITY OF TARTU  
Institute of Computer Science  
Computer Science Curriculum

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# Hybrid Recommendation System for Financial Institution

Master's Thesis (30 ECTS)

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# Hybrid Recommendation System for Financial Institution

## Abstract:

Recommendation systems are often used by companies to target customers with personalized offers. This, in turn, helps to increase the revenue from marketing campaigns and improve customers' experience. Recommendation systems are commonly used in e-commerce sites (Amazon, E-bay) and entertainment platforms (Spotify, Youtube). However, their use has not yet been broadly explored in the financial sector. In this thesis, we propose and evaluate a hybrid recommendation system algorithm to generate personalized offers for customers of a bank. The recommendation system algorithm uses implicit information about customers' transactions with companies in order to recommend companies that customers have not recently visited, and that they might wish to visit in the near future. The algorithm is shown to be robust enough to overcome the cold start problem, which in our case is the lack of data from customers with a small transaction history. The algorithm evaluated using real datasets (customer's transactions), which are provided by a major North-European bank. Compared to a random recommendation model, which is presently in use by the bank for their marketing campaigns, our recommendation algorithm has a maximum lift value against random targeting of 416 and minimum 55 which shows the effectiveness of our approach.

## Keywords:

Recommendation system, banking, customer analytics

## CERCS:

P170, Computer science, numerical analysis, systems, control

## Hübriidsed Soovitused Finantsasutuse Jaoks

### Lühikokkuvõte:

Ettevõtted kasutavad sageli soovituste süsteeme, et suunata kliente individuaalsetele pakkumistele. See omakorda aitab suurendada turunduskampaaniate tulusid ja parendada klientide kogemust. Soovituste süsteeme kasutatakse tavaliselt e-kaubanduse saitidel (Amazon, E-Bay) ja meelelahutusplatvormidel (Spotify, Youtube). Siiski ei ole nende kasutamist finantssektoris veel põhjalikult uuritud. Selles väitekirjas pakume ja hindame hübriidsete soovitustelike süsteemide algoritmi, et genereerida isikupärastatud pakkumisi panga klientidele. Soovituste süsteemi algoritm kasutab kaudset teavet klientide tehingute kohta erinevate ettevõtetega, et soovitada teisi ettevõtteid, mida kliendid viimasel ajal pole külastanud, kuid võiksid lähimas tulevikus seda teha. Algoritm näib olevat piisavalt tugev, et külmkäivitusprobleemi ületada, mis meie puhul on klientide vähene tehingualugu. Algoritm hinnati tegelike andmekogumite (kliendi tehingud) abil, mida

pakub Põhja-Euroopa pank. Võrreldes juhusliku soovitusmudeliga, mida pank praegu oma turunduskampaaniate jaoks kasutab, on meie soovitusalgoritmil maksimaalne tõusupiirang juhusliku suunamise korral 416 ja minimaalse korral 55, mis näitab meie lähenemise efektiivsust.

**Võtmesõnad:**

Soovitussüsteem, pangandus, kliendiartiklid

**CERCS:**

P170, Arvutiteadus, arvutusmeetodid, süsteemid, juhtimine (automaatjuhtimisteooria)

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Tartu, 20.05.2018