ABSTRACT

Our work focuses on the improvement of the accuracy of context-aware recommender systems. Contextual information showed to be promising factor in recommender systems. However, pure context-based recommender systems can not outperform other approaches mainly due to high sparsity of contextual information. We propose an idea to improve accuracy of context based recommender systems by context inference. Context inference is based on e ect discovered by analyses of the context as a factor influencing user needs. Analyses of the news readers reveals existence of behavioural correlation which is the main pillar of proposed context infer- ence. Method for context inference is based on collaborative ltering and clustering of web usage (as a non-discretizing alternative to association rules mining).

Categories and Subject Descriptors H.3 [Information Storage and Retrieval]: Clustering In- formation Filtering; H.2 [Database Applications]: Data mining General Terms Algorithms Keywords context, recommender system, clustering, user behaviour

1 MOTIVATION

Context-aware recommender systems have become very popular since variety of contextual information could be acquired. With an increase of the smartphone popularity and available features which they provide, we are able to associate user needs with contextual information. From the high level context types such as location, time, weather, to the low level context types such as humidity, noise, movement, . we study the impact of the context on the user behaviour and needs. However context itself has shown to be insuffcient when it comes to accuracy of context-aware recommender systems. Context is therefore used as a secondary aspect for generating recommendation. One reason for low accuracy is high sparsity of contex- tual information. High sparsity is caused by various natures of users and their preferences [5]. Some users do not want to share their personal information such as location, thus causing missing contextual information. Poor context infor- mation leads to low accuracy in prediction. On the other hand, some users are willing to expose even personal con- textual information such as emotions. They are willing to answer question and explicitly express contextual informa- tion, which is then useful in context-aware recommendation. Our idea is to propagate contextual information from one user to another in order to reduce the sparsity of data. We propose the propagation of the context by exploiting a corre- lation in users' behaviour. We assume that users' behaviour is not random, it is based on context of the user. For in- stance, Perse [14] discovered association between negative mood and tendency to watch competition-style programs as a result of the need to experience happiness. Action-style programs are selected when viewers are in a positive emo- tional state. However, even if some associations are valid for majority of users, we expect that there are associations which could be discovered only

for a subset of users. This leads to clustering of users by their behaviour. Identifying clusters of similar users helps to identify how to propagate the context between users. We discover associations between the need and context using alternative to standard association rules mining. The di erence is in non-discrete values which we use. For exam- ple, wrong discretization causes noise, as we lose the ability to compare them and thus sort them. Therefore we expect to achieve higher accuracy when we use proposed value based associations discovery instead of item based. To accomplish value based associations discovery we combine stan- dard techniques from machine learning such as x -means [6] and vector distance computation (Euclidean distance)