Information Recommendation Using Context in a Specific Domain

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Adaptive and personalization methods all engage in a recommendation process. This process consists of a few decisions that have to be made in order to deliver something to the user. More often than not adaptive and personalization methods engage in only one decision and that is what to deliver to the user. This is especially true for methods that work in an on-demand basis, thus deliver content when a query for it is made. These methods generally do not consider if it is the right time to deliver the content, in what volume should it be delivered and how will it be presented, which are the three other decisions in any recommendation process.

Apart from methods working in an on-demand basis there are also a few methods that work proactively. A proactive method decides on an action by considering various types and amount of criteria. This can be as simple as setting the sound profile according to the user defined time windows [1] or as complicated as recommending the right music for a given user and his friends around him considering their mood for example [2]. Our project is aimed at designing a method that is able to effectively and efficiently learn what actions should be performed in what situations and then use this model to aid end-user application in autonomous decision process by recommending actions for a given situation.

To accomplish this we devised a rule based method that uses different classes of contextual information as antecedents for rules that are formed using feedback from an end-user application. Both rules and situations have a certainty assigned to them that are used further on in the recommendation process to compute the final score for possible actions. The strength of our method is in its domain independence. All situation classes, situations and possible actions are defined on-the-fly by a particular application which makes it possible to define correct models for different domains as each may require a different set of situation classes that may be important. The situation classes and situations that are fed to our method pose as abstract symbols with no required background meaning which makes it possible for processing outside the

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client's device without facing any privacy or security concerns. This is a very important feature because even though the data have no meaning they can still be used to support collaborative sharing of user models. Another important aspect is *time sensitivity principle* that is we employed in order to be able to accommodate to preference changes that may happen over time. This can be for example a user that usually reads news during his commutes to his workplace, but now starts to travel by his car which naturally changes preferences for reading news during his commutes.

For evaluation on our method's performance we have implemented a simulation framework and a mobile news recommendation application. Using the simulation framework we have performed a series of simulations for refinement of our method's parameters, so as to be able to reliably identify situations for recommending specific actions. After a series of these simulations and adjustments to our method we were able to reliably identify peeks that corresponded with the virtual user's preferences.

To evaluate our method in a real life scenario we have also created a mobile news application that uses our recommendation framework for identifying right situations for an autonomous news push. This application is used for a real life experiment that is part of the work for upcoming weeks. Since the target domain is news recommendation, the contextual information classes and recommendation actions are tailored to it as well. The specific situation classes that we identified regarding the news recommendation domain are:

- Time information: *time of day, day of week, week of month and month of year*
- Weather information: *weather, temperature, wind, pressure*
- Location information: *identifies whether a user is in motion or at some place*
- Calendar events: *identifies proximity of a calendar event*
- Dead time: *identifies parameters of a user session in our news application*

The situations from these classes are fed continuously to our recommendation framework together with action feedback which can say that it is either good time for a news push or not a good time for a news push.

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