Motivating Serendipitous Encounters in Museum Recommendations

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1 Background and motivation

Recommender Systems (RSs) try to assist users to access complex information spaces. They provide the users with personalized advices based on their needs, preferences and usage patterns. Various recommendation techniques have been investigated and each one has its own strengths and weaknesses. Especially, content-based techniques suffer of the *over-specialization* problem. Indeed, sometimes RSs can only recommend items that score highly against the user's profile and, consequently, the user is limited to obtain advices only about items too similar to those she already knows.

We propose to inject diversity in the recommendation task by exploiting the content-based user profile to spot potential surprising suggestions. In addition, the actual selection of serendipitous items is motivated by an applicative scenario. Thus, the scenario concerns with personalized tours in a museum and serendipitous items are introduced by slight diversions on the context-aware tours.

2 Serendipitous recommendations

The idea of serendipity has a link with de Bono's "lateral thinking" [1] which consists not to think in a selective and sequential way, but accepting accidental aspects, that seem not to have relevance or simply are not sought for. This kind of behavior helps the awareness of serendipitous events, especially when the user is allowed to explore alternatives to satisfy her curiosity as in the museum scenario.

Toms [4] suggests four strategies to introduce the serendipity: 1) Role of chance or 'blind luck', implemented via a random information node generator; 2) Pasteur

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principle ("chance favors the prepared mind"), implemented via a user profile; 3) Anomalies and exceptions, partially implemented via poor similarity measures; 4) Reasoning by analogy, whose implementation is currently unknown.

In [2] we propose an architecture for hybridizing a content-based RSs by the "Anomalies and exceptions" approach to provide serendipitous recommendations alongside classical ones. Thus, the basic idea underlying the proposed architecture is to ground the search for potentially "serendipitous" items on the similarity between the item descriptions and the user profile.

3 Personalized museum tours

RSs traditionally provide a static ordered list of items according to the user assessed interests, but they are not aware about context facets concerning the user interaction with environment. Besides, if the suggested tour simply consists of the enumeration of ranked items, the path is too tortuous and with repetitive passages that make the user disoriented, especially under a time constraint. Moreover, different users interact with environment in different manner, e.g. they travel with different speed, they spend different time to admire artworks, they divert from the suggested tour. Consequently, the suggested personalized tour must be dynamically updated and optimized according to contextual information on user interaction with environment.

The diversity injection is pursued by serendipitous disturbs to the the personalized tour. Indeed, the previous personalized tour is augmented with some items that are along the path and that are in the ranked list of serendipitous items according to the learned user profile and context facets [3]. The resulting path most likely has a worse fitness value and then a further optimization step is performed. However, the further optimization step should cut away exactly the disturbing serendipitous items, since they compete with items that are more similar with the user tastes. Therefore serendipitous items are differently weighed from the fitness function: their supposed stay time is changed. This implementation expedient also deals with the supposed serendipitous items should turn out not so serendipitous and the user should reduce the actual stay time in front of such items.

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