Context-Aware Advertising

Thesis Proposal
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Problem Definition

• The invention of IPTV created an opportunity for product and service providers to better target their audience and cater for their needs. This is called behavioral targeting.
• Helping users receive information on services or products that are more relevant to the target users will help providers increase revenues.
• To the best knowledge of the author, this opportunity has not been consumed to its full benefit yet.
• This research will capitalize on this opportunity to create a context-aware recommendation engine that recommends advertisements for IPTV systems.
• The engine will be developed over a scalable architecture and technology that supports near real-time requests.
Motivation

- There is a huge market for advertising
- Increasing the benefit from these advertisements will result in increasing the revenues
- Behavioral targeting of content to users is a $20 billion industry and it is growing rapidly [1]
Objective

- Create a centralized recommendation model that is context aware and scalable.
- The model will support real-time requests where each request contains the context of a user or a group of users.
- The system will recommend a set of advertisements that are most relevant to the user or the group. Recommending a set of advertisements to a group of users will help in increasing bandwidth efficiency.
This is currently a work in progress.

Current suggestions:

- Use Spark technology for in-memory, distributed computing [6]
- Use a queuing system for inputs and outputs
- Use recommendation engine supplied by MLlib (Spark module)
- Since Spark runs Scala and Java, there is a possibility to use Weka [7] machine learning libraries instead.
- Deploy over a Hadoop cluster to utilize its features
The concept of context-aware advertising applies to IPTV systems and mobile advertising systems.

Contributions in IPTV systems cover ad placement, bidding models [1], and architecture [2].

Contributions in mobile advertising cover developing a research model such as [3], creating a new recommendation algorithm that factors in context data such as [4] or propose a delivery system such as [5].

Context-Awareness also applies for recommending content to users in IPTV systems. This has been already studied but not included in this presentation for brevity.
Summary of Context Information
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### Context Information

#### User Context
- **Age**: Yes, Yes
- **Identity**: Yes
- **Profile/Preferences**: Yes, Yes, Yes
- **Location**: Yes, Yes, Yes
- **Granularity of location**: Room, GPS, Visiting Area, GPS and Abstract Street/Building
- **User Activities**: Web Browsing Activities, TV Viewership Activities
- **Emotions**: Yes
- **Needs**: Utilitarian/Hedonic
- **Agenda**
- **Consumption History**
- **Gender**
- **Purchase History**

#### Service Context
- **Current Program**: Yes
- **Brand Information**: Yes
- **Promotion**: Yes
- **Content Language**
- **Content Format**
- **Content Description**
- **Access rights**
- **Location**
- **Current Content Viewership**
- **Rating/Actual Viewership**

#### Computing Context
- **Network and Bandwidth**: Yes
- **Device Type**: Yes
- **Device Status**
- **Operating System**: Yes

#### Physical Context
- **Surrounding Environment**: Yes
- **Nearby Objects**: Yes
- **Weather**: Yes

#### History Context
- **Time**: Day, Week day, Week end, Visiting Time
- **Session Mobility**

#### Privacy
Critique

• Most of the papers do not discuss performance or scale of their solutions (how many users can they support, or rate of recommendation – throughput)

• Several papers did not report on the accuracy or effectiveness of their proposed solution

• As can be seen in the table on the previous slide, most information comes from statically input data such as demographics and interests and very few context parameters are being used.
Conclusion

• There is room for contribution in the field of context-aware advertising to further enrich the recommendation engine with more context data.

• The exact context information is not decided yet.

• There is also a need to provide a scalable architecture that can support real-time requests for recommending advertisements.
References


