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Research paper

A Gamified Recommendation Framework

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Abstract

A recommendation system is intended to provide a user with relevant resources based on their preferences. The latter thus reduces his search time but also receives suggestions from the system to which he would not have spontaneously lent attention. The development of the big data technologies and its popularity have included the creation of such systems. Content-based recommendation systems rely on user-based ratings on a set of documents or items. The objective is then to understand the motivations leading him to judge as relevant or not a given item. The gamification aims to use the game to push consumers to do things they would not have done on their own: Fill out a questionnaire, buy a product, watch advertisements or assimilate information. In this paper we join the fields of gamification and recommendation systems to provide a new method and architecture to recommendation.

Keywords:*; big data; gamification; kappa; lambda; real time; recommendation; system.*

1. Introduction

1.1. Recommendation systems

This document can be used as a template for Microsoft Word versions 6.0 or later. Do not submit papers written with other editors A recommendation system[1] is a system that can provide personalized recommendations or guide the user to interesting or useful resources within an important[2] data space.

In practice, most recommendation systems consist of web applications that offer resource lists to users. Such resources can respond to different types of data such as films, music, Books, Restaurants, News, Scientific articles, Web pages, etc.

1.2. Types of recommendation

It is possible to classify the recommendation systems in different ways. The most common classification is a classification of two approaches: Content-based recommendations[3] and collaborative filtering[4]. In addition to these two approaches, [5]proposes to consider three other approaches: the population-based recommendation, the utility-based recommendation and the knowledge-based recommendation. As shown in figure 1 a representation of the main recommendation techniques. The problem with this representation is the variety and volume of actual data to be processed in actual and potential future systems.

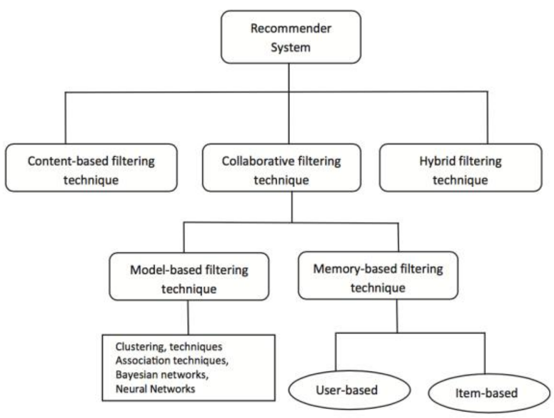

Fig. 1: Recommendation techniques

1.3. Recommendation Analytics

Recommender Systems typically employ approaches and methodologies from other adjacent areas – such as Human-Computer Interaction or Information Retrieval. Nevertheless, most of these systems display in their core an algorithm that can be interpreted as a distinct instance of a Data Mining technique.
The data mining process consists of 3 levels[6], brought out in succession: Data Preprocessing, Data Analysis, and Result Interpretation, presented in figure 2

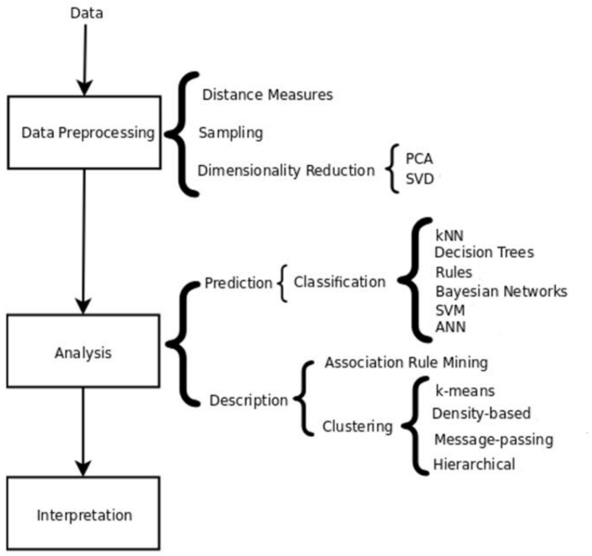

Fig. 2: Steps and methods in a Data Mining solution.

2. Big data architecture

Big data refers to the deluge of computer data passing through the world. These data become so large that they can no longer be stored in databases of normal size, which leads to the use of increasingly powerful computer tools to manage them. Big data can be defined by its three (or even four) major characteristics, all starting with the letter V: Volume, Velocity, Variety, to which can be added the Veracity of the data.
Today there are a large number of big data architectures, the Lambda architecture, the Kappa architecture, grouped under the name of polyglot processing.

2.1. Lambda

Created by Nathan Marz[7] based on his experiences with Twitter and Backtype, the goal of the Lambda architecture as represented in figure 3, is to provide an almost real-time processing model on large volumes of data, by proposing a new computation model. This model tries to find the balance between fault tolerance, latency constraints (very low latency for read/write) and hard disk throughput based on both batch processes that provide batch views and real-time processes that provide views, and then joins them before they are presented.

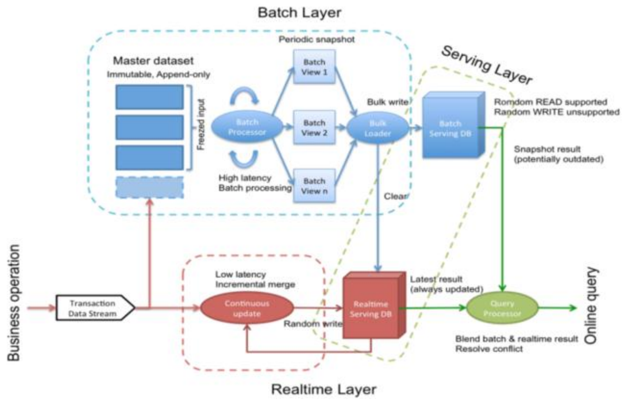

Fig. 3: Lambda Architecture

2.2. Kappa

Created by Jay Kreps[8] based on his experiences at LinkedIn and his feedback on Lambda architecture. Based on the observation that most solutions are capable of both real-time processing (streaming) and batch processing, the Kappa architecture simplifies the Lambda architecture by merging the batch layer and the Speeding layer. It also makes a modification on DBMS which must be an immutable log file system. The Kappa architecture is not intended for data storage, but only for data processing, as shown in the following figure 4:

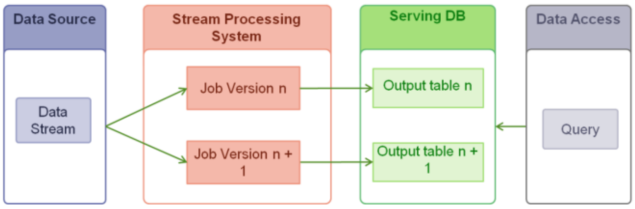

Fig. 4: Kappa Architecture.

3. Gamification

The gamification[9] is the transfer of the mechanisms of the game in other areas. It consists in integrating systems, techniques or mechanisms of play to improve an experience and increase efficiency by bringing emotion and pleasure. Its objective is to increase the acceptability and use of these applications by relying on the human predisposition to play. The concept of gamification is represented by the MDA framework[10] «Mechanics, dynamic, aesthetic»

Mechanics: a grouping of functional elements acting on the conceptual level to guide the action of users.

Dynamics: represents the interaction of users with the mechanics of the system at a time between user and the interface or users between them.

Aesthetics: this phase is the result and the feeling generated by the user through its interaction with the two previous components.

These 3 components[11] are dependent and each one generates a panel of items as shown in figure 5 to finally provide a unique user experience depending on his behaviour and state of mind as a human, this kind of process coupled to a recommendation system powered by big data can enlighten the spark of recommendation in various domains.

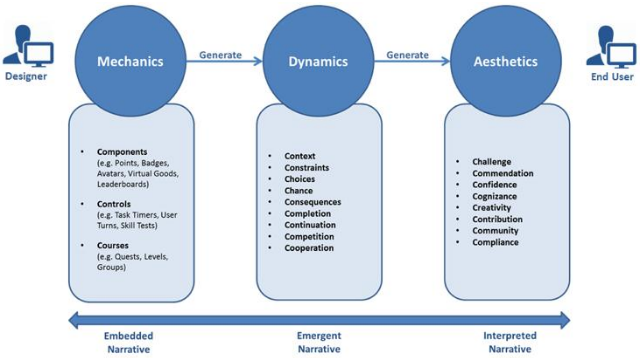

Fig. 5: MDA Framework.

4. Proposed solution

4.1. Study of existent

After studying the actual architectures[12]–[15], a generic illustration was made on figure 6. Two main parts are working together to ensure a classic recommendation.

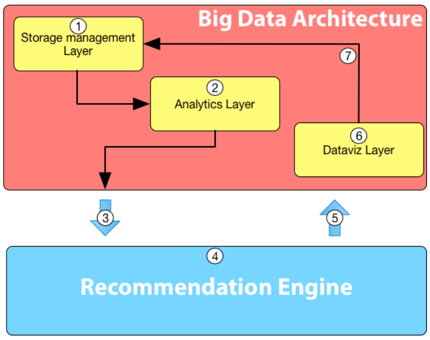

Fig. 6: Classic Architecture

4.2. Proposition

As described previously, gamification can be an optimal solution to the recommendation dilemma, after time and effort a functional architecture is provided in figure 7, a gamification engine[16] is properly placed between the big data platform and the recommendation engine to provide a continuous feed of data related to users and systems with a gamified perspective. With those components in place a feedback “learning line”[17] is built to adapt the needs in terms of recommendation and data.

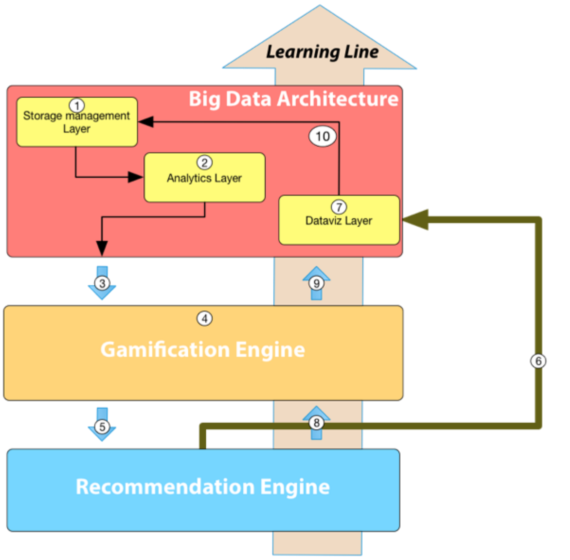

Fig. 7: Proposed View

5. Results

With the previous architecture in motion a practical one emerged in figure 8 for data flow testing and implementation. The data is divided into 2 segments: Simple Data and Gamified User Data.
The gamified user data contains the user profile and his overall score with the gamified platform, the data is classified with a machine learning algorithm cleaned and presented as enhanced data, so that it can be qualified as an advanced recommendation, and lastly, an application of a machine learning classification to choose between a system recommendation and a user recommendation.

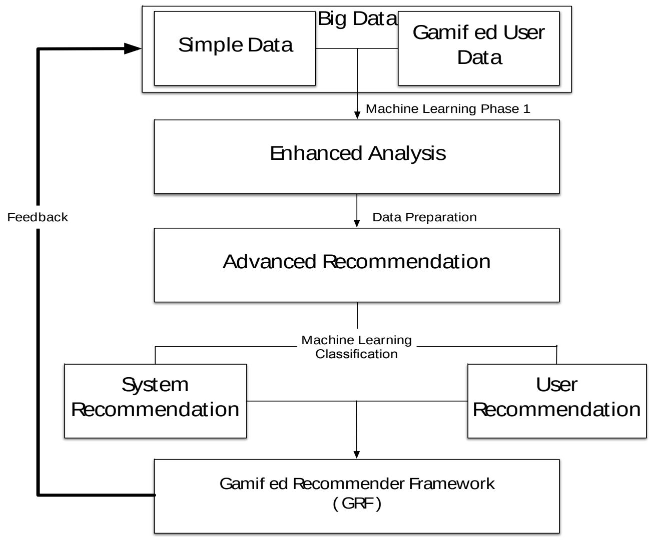

Fig. 8: Gamified Recommendation Framework.

This architecture in figure 8 will not only impact the external recommendation aspect of data but it will enhance perceptions and reflexes for system designers in order to follow up trends in users behaviour and needs in matter of products and services creating a win-win situation.

6. Conclusion

this paper we presented two fields apart and joined them in a solution for advanced recommendation systems, in this architecture we take profit of the advantages of the techniques of gamification and the various types of recommendation to enhance the latter.
Our future work will be on feature engineering and selection to implement this model on a live simulation with metrics in a big data environment to scale the impact on massive and variety batches of data in a real time process.

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