International Journal of Scientific Research & Engineering Trends
Volume 6, Issue 3, May-June-2020, ISSN (Online): 2395-566X

An Efficient Recommendation System using Collaborative Filtering and BlockChain Technology

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***Abstract* – The Web creates excellent opportunities for businesses to provide personalized online services to their customers. Recommender systems aim to automatically generate personalized suggestions for products/services to customers (business or individual). Although recommender systems have been well studied, there are still two challenges in the development of a recommender system, particularly in real- world B2B e-services. In the proposed recommendation technique utilizing the fast diffusion and information sharing capability of a large customer network is used. The proposed method follows the Blockchain technology and collaborative filtering (CF) principle over distributed and local searches for similar neighbors over a customer network to generate a recommendation list to the users according to their previous product search and purchase. Security for Payment confirmation has been implemented with a graphical password verification concept by link chain algorithm.**

***Keywords* – Decentralized BlockChain, Security and privacy.**

I. INTRODUCTION

With the recent explosive growth of the amount of content on the Internet, it has become increasingly difficult for users to find and utilize information and for content providers to classify and catalog documents. Traditional web search engines often return hundreds or thousands of results for a search, which is time-consuming for users to browse. On-line libraries, search engines, and other large document repositories (e.g. customer support databases, product specification databases, press release archives, news story archives, etc.) are growing so rapidly that it is difficult and costly to categorize every document manually. To deal with these problems, a look towards automated methods of working with web documents so that they can be more easily browsed, organized, and cataloged with minimal human intervention. In contrast to the highly-structured tabular data upon which most machine learning methods are expected to operate, web and text documents are semi-structured.

II. LITERATURE REVIEW

TITLE 1: VBPR: Visual Bayesian Personalized Ranking From Implicit Feedback
AUTHORS:Ruining He, Julian McAuley
Modern recommender systems model people and items by discovering or 'tearing apart' the underlying dimensions that encode the properties of items and users' preferences toward them. Critically, such dimensions are uncovered based on user feedback, often in an implicit form (such as purchase histories, browsing logs, etc.); besides, some recommender systems make use of side information, such as product attributes, temporal information, or review text. However, one important feature that is typically ignored by existing personalized recommendation and ranking methods is the visual appearance of the items being considered. In this paper, we propose a scalable factorization model to incorporate visual signals into predictors of people's opinions, which we apply to a selection of large, real-world datasets. We make use of visual features extracted from product images using (pre-trained) deep networks, on top of which we learn an additional layer that uncovers the visual dimensions that best explain the variation in people's feedback. This not only leads to significantly more accurate personalized ranking methods, but also helps to alleviate cold start issues, and qualitatively to analyze the visual dimensions that influence people's opinions.

TITLE 2: An Attribute-Based Encryption Scheme to Secure fog Communications
AUTHORS:ArwaAlrawais , Abdulrahman Alhothaily, Chunqiang Hu , Xiaoshuang Xing, and Xiuzhen Cheng A highly virtualized paradigm that can enable computing at the Internet of Things (IoT) devices
residing in the edge of the network, for the purpose of delivering services and applications more efficiently and effectively. Fog computing is a promising computing paradigm that extends cloud computing to the edge of the network. It enables a new breed of applications and services such as location awareness, quality of services (QoS) enhancement, and low latency. Fog computing can

provide these services with elastic resources at low cost. It also enables the smooth convergence between cloud computing and IoT devices for content delivery. The primary security requirements for the communications between the fog nodes and the cloud are: confidentiality, access control, authentication, and verifiability. To effectively defend against the aforementioned threats, we need an efficient security mechanism that can satisfy the primary security requirements. Key exchange protocol to establish secure communications among a group of fog nodes and the cloud. In our protocol, we utilize the digital signature and CP-ABE methods to achieve the primary security goals: confidentiality, authentication, verifiability, and access control.

TITLE 3: Imagenet Classification with Deep convolutional Neural Networks
AUTHORS: Alex Krizhevsky, Ilya Sutskever, Geoffrey E. Hinton
We trained a large, deep convolution neural network to classify the 1.2 million high-resolution images in the Image Net LSVRC-2010 contest into the 1000 different classes. On the test data, we achieved top-1 and top-5 error rates of 37.5% and 17.0% which is considerably better than the previous state-of-the-art. The neural network, which has 60 million parameters and 650,000 neurons, consists of five convolution layers, some of which are followed by max-pooling layers, and three fully-connected layers with a final 1000-way softmax. To make training faster, we used non-saturating neurons and a very efficient GPU implementation of the convolution operation. To reduce over fitting in the fully-connected layers we employed a recently-developed regularization method called “dropout” that proved to be very effective. We also entered a variant of this model in the ILSVRC-2012 competition and achieved a winning top-5 test error rate of 15.3%, compared to 26.2% achieved by the second-best entry.

TITLE 4:Trirank: Review-Aware Explainable Recommendation by Modeling Aspects
AUTHORS:Xiangtan He, Tao Chen, Min-Yen Kan, Xiao Chen
Most existing collaborative filtering techniques have focused on modeling the binary relation of users to items by extracting from user ratings. Aside from users' ratings, their aliased reviews often provide the rationale for their ratings and identify what aspects of the item they cared most about. We explore the rich evidence source of aspects in user reviews to improve top-N recommendation. By extracting aspects (i.e., the specific properties of items) from textual reviews, we enrich the user item binary relation to a user item aspect ternary relation. We model the ternary relation as a heterogeneous tripartite graph, casting the recommendation task as one of vertex ranking. We devise a generic algorithm for ranking on tripartite graphs. TriRank and specialize it for personalized recommendation. Experiments on two public review datasets show that it consistently out-performs state-of-the-art methods. Most importantly, TriRank endows the recommender system with a higher degree of explain ability and transparency by modeling aspects in reviews. It allows users to interact with the system through their aspect preferences, assisting users in making informed decisions.

III. MATERIALS

1. Hardware Requirements
- •Processor: Pentium Dual Core 2.3 GHz
- •Hard Disk : 250 GB or Higher
- •Ram: 1 GB

2. Software Requirements
- •Operating System : Windows 7 or Higher
- •Languages used : Java (JSP, Servlet), HTML
- •Tools : JDK 1.7, Net Beans 7.0.1, SQLyog
- •Backend : MySQL

IV. METHOD

The following are the modules of the project along with the way they are implemented and that is planned with respect to the proposed system, while overcoming existing system and also providing the support for the future enhancement system. There are totally five modules used in our project which is listed below. Each module has specific usage in the project and is description is given below followed by the list of modules.
1. User Interface
2. Clustering transaction history
3. Product Recommendation
4. Payment gateway security

- **User Interface:**

In the industrial design field of human–machine interaction plays an important role. It is the space where interaction between humans and machines occurs. Its goal of interaction between a human and a machine at the user interface is effective operation. Input allowing the users to manipulate a system. The user will perform either login or registration operation. User need to register two images along with profile creation and select any point on the images. After this operation get over, he will go to the next phase.

- **Clustering Transaction History**

Input: Transaction history database Output: Clustered set of transactions
The initial phase in the process of finding the frequent item is to cluster the transaction history database. The transaction history database contains the previous transactions made by the customers. The details include customer id, the set of items bought along with the transaction id. This phase has two sub phases viz. The

previous transactions and searches that has been done by the user has been taken into account for doing this phase. Same category of transactions is filtered using collaborative filtering algorithm.

- **Product Recommendation:**

Finally recommended items are filtered.
Including when purchase rate or like a new item, as well as changes in the interests of other customers like.
Similar products are clustered and linked by block chain techniques.
Items that interest Wish List or Shopping Cart
Finally recommended items are provided by the customer.

- **Payment Gateway Security:**

While purchasing any product user will be asked to verify with password. It keeps up static transaction and login password tables for distinguishing and confirming the authenticity of the clients. Furthermore, the picture pixel utilizing for to do the payment. In the event that we are not pick amend point picture implies the payment will not be initiated. It is secure technique.

V. ANALYSIS

1. Existing System

The items or user profiles often present complicated tree structures in business applications which cannot be handled by normal item similarity measures. Promising frequent item set assumes that the two thresholds minimum support and confidence doesn't change. Items which are neither bought frequently nor bought sparingly, which constitute the middle item infuse additional noise. This method will not be efficient if the transaction database turns out to be homogeneous. This type of clustering is not user controllable except for the modification of support values Fuzzy preference tree-based recommendation approach is tested and validated using an Australian business data set and the Movie Lens data set. Payment process is verified and confirmed by means of OTP method. But it may lead to some security issue.

2. Drawbacks of Existing System:

This method will not be efficient if the transaction database turns out to be homogeneous. This type of clustering is not user controllable except for the modification of support values

- Time consuming
- Need more user interaction
- Irrelevant product may be recommended
- Payment problems occur many times.

3. Proposed System

This project aims to accomplish an optimized predicting algorithm to find the frequent items likely to be purchased by the customer and to provide a secured payment verification method. This algorithm has better running time than FUP incremental algorithm. It helps to find frequent items in a dynamically added transaction. The previous purchasing patterns of the customers information is procured, to arrive in conjunction with the purchasing mentality of particular sets of customers. Acts as a powerful predictive tool for the marketers in enhancement of their sales strategy. A step-wise elucidation of the process is as follows. Disintegrate the transaction history database into purposeful pattern separated clusters. Mapping the current customer to the best suited cluster. Sequencing of past purchases of the customers. Prediction of the purchase sequence of the current customer. Extracting the frequent item from the transactions. Block chain and collaborative filtering techniques supports for this approach. Each time user pays for a product while purchasing he need to verify with the image point verification.

4. Advantages of Proposed System:

- Disintegrate the transaction history database into purposeful pattern separated clusters.
- Mapping the current customer to the best suited cluster.
- Sequencing of past purchases of the customers.
- Prediction of the purchase sequence of the current customer.
- Extracting the frequent item from the transactions.
- Graphical password verification is more secured than OTP verification.

VI. ARCHITECTURE DIAGRAM

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be the considered to be the most critical in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

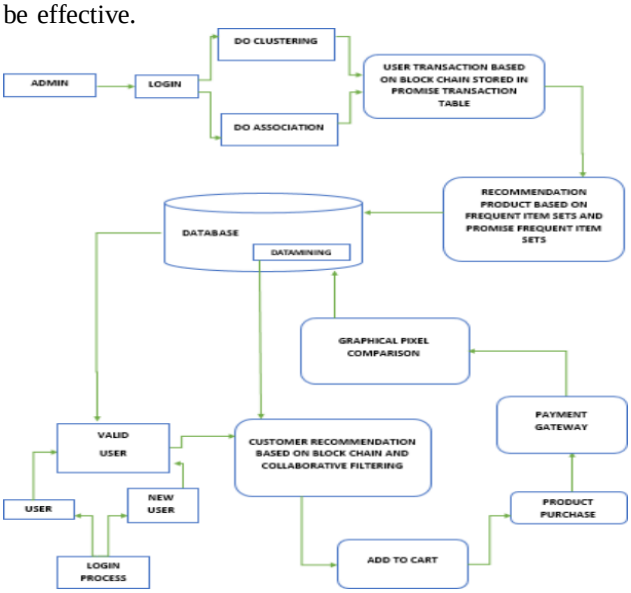

Fig.1. Architecture Diagram.

VII. CONCLUSION

The efficient recommender system was achieved by analyzing the personal transaction of an individual using blockchain and the interests of the users can be identified using the collaborative filtering technique. The security while transaction also be done by graphical key verification method.

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