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Modern Recommendation System for Big Data Based E-Commerces Platform

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Abstract:
An Ecommerce website is known as the platform where selling and buying product, services, activities over the internet. Ecommerce system has already ruled the entrepreneur world in current trends. Whenever people want to sell or buy the products, they only need to register and simply do the selection of items and do the transactions over the internet. Most people prefer to purchase the products that they want on online because it is more efficient and reliable to the customers. The recommendation system will identify the products based on the customers' behavior pattern, preference, psychology, current trends and so on. The purpose of the algorithm is to make the ecommerce system work efficiently so that the when the customer is surfing the website, the algorithm will determine the set of products or services for the customer automatically connecting to the database and it will show the similarities of the products that users has been search for. Or, the system thinks that these set of products are better for him. Besides, the recommendation system will run in the background even someone is new to the system while it was being used. Also, a common problem that customers always face is the network page loading delay, network delay, jitter, etc when there are more users are on that site. These problems will be identified by using network monitoring tools and the proposed system will detect it in efficient way. The system admin will be able to see instantly the current usage pattern of the said website.

Keywords*: Ecommerce, Recommendation System.*

I. INTRODUCTION

A. Project Background

A Recommendation system is where a system has generated or suggest a list of products which related to the customer's preferences or expectations. Recommendation system will identify products that most relevant to the customers.The algorithm used in the system can enhance the financial growth and revenue. However, in this project, it needs to integrate the recommendation algorithm in an e-commerce website and analyze the network performance when there is a visitor with the website. While the user enters the website, it connected to the back-end and while the website running, the recommendation system will run on the server too.

B. Objectives

The objectives of this project are to develop a system that will be able to

- To design recommendation system algorithm based on existing data and business logic and big data.

- To develop system that able to use the information of utilization pattern and related analytics that would lead to better system management and network maintenance to facilitate. For example, if the system has high

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traffic, the network and computing resources must be upgraded.

C. Problem Statements

An e-commerce website andarecommendationalgorithmisthingsthat peoplearelookingfor, however, there several challenges that doesn't aware of which is a Recommendation Algorithm needs an e-commerce platform where the algorithm can berun. Besides that, recommendation algorithm also needs to be checked with real data whether the algorithmworks and produce accurate results

D. Project Scope

- Prepare all hardware and software needed
  - Laptop, Coding Software (phyton), Coding Software/platform and NOSQL Database.
- Setup and develop the system in the hardware and software for the output
  - Construct the algorithm by following coding platform for Phyton porgramming.
- Compile and test the system
  - Compiling all the codes and run the algorithm to fulfill the objectives
- Documentation
  - Testing the simulation system by following the objectives.
- Update journal paper from day 1 to include every change and new experiments/results anytime.
- Submission of journal paper in IEEE + JTEC format (on JTEC website).

II. LITERATURE REVIEW

A. Background

The related articles related to this project will be discussed here. In addition, to define an environment where other solutions could be created. This chapter concludes information about recommendation systems, e-commerce platform, network performance and the related work on this project as well. The review starts with an explanation of the recommendation system on Ecommerce. Instead, it continues with a literature review consisti ng of the findings of previous researchers relating to the study area.

B. Review Paper

In [1], the authors proposed a work focusing on the traditional recommendation techniques that could be explored in an enhanced manner, valuable patterns and hidden knowledge. They have noted that valuable patterns and hidden knowledge can be discovered using traditional recommendation techniques in an enhanced manner. The suggested the algorithm, called behavior-based rational methodology, which uses labels and categories of each product visited to track the complex actions of consumers, uses ' popularity ' metrics for the more comprehensive list of items recommended.

The authors in [2] proposed a review of the page recommendation model using the approaches to machine learning. This ranking on the eCommerce system is like indexing the page or ranking the product. It's like the product is recommended by the company rating and could be regular. Weekly, monthly or annually, they rely more on the product recommendation development model with the higher accuracy and optimized time-based parameters

Authors suggested in [3] a mobile eCommerce advice system based on a fusion of multi-source information for sustainable e-business. To evaluate the weights of the recommendation algorithms, the authors want to suggest a method that can boost the radial basis function (RBF) network. The authors

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also improved the Dempster-Shafer theory which can be fused to the information from multiple sources. We also note that these experimental results reflect the traditional method that can be introduced and implemented in terms of precision, consistency, degree of coverage and rate of recall.

In[4], the authors proposed a system of recommendations based on deep learning: a survey and new perspectives. In this article, the authors will review the latest research efforts into deep learning-focused advocacy structures in a comprehensive way, which will provide a taxonomy of deep-learning recommendation models and an overview of the project.

In [5] the authors suggested a smart recommendation system. The Random Network is based on this system. The authors noted that the products offered by Big Data systems are either comprehensive or important to their needs can not be guaranteed by Web users. In average, after learning iteratively from its clients, IRS outperforms Big Data recommender systems.

The authors in [6] are making a survey which is focusing on Dynamic Recommendation System for e-commerce. They using the hybrid recommendation algorithm which is to find user's behaviour and then similar user behaviour score where it is already computed. This recommendation system is very useful for both e-commerce system providers and users where the algorithm can be learned by how the users interact with the system.

The authors proposed an e-commerce recommendation system collaborative filtering algorithm based on trust [7]. In this article, they explore more about a fusion of confident data user similarity in the recommendation system. It can be applied in a recommendation system of any kind. The author also stated that the similarities in the user interaction with the website should be found in those algorithms.

The NoSQL Data-based Personalized Recommendation Framework for C2C e-commerce is suggested by authors in [8]. In this report, they implement an approach based on the item description which recommends e-commerce websites. The hybrid algorithm is almost like that. But the algorithms in these cases recommend the item in particular for the item description that customers require.

In [9], the authors proposed the recommendation system for e-commerce using Big data. In this paper, they are improving the traditional algorithms into a hybrid system by combining two or more recommendation techniques to get better results. The algorithms given names is called Content Based Collaborative Filter (CBCF). They also considering the large scale of customer space and variety velocity of data traditional data processing technologies cannot cope up with the problems.

In [10], the authors is proposing the smart e-commerce integration with recommendation system. In this case, the e-commerce system is assisted by cloud server. It involved QoS and QoE so that the e-commerce user will experience the significant of the improvement of the algorithms. As stated earlier, it's a combination of the cloud computing into the e-commerce system and a bit engagement of the recommendation algorithms.

The authors in[11] suggested an algorithm and recommendations methods for better collaborative filtering. In this study, content recommendation technology, collaborative filtration algorithm technology, and hybrid recommendation system are mainly included. Collaborative filters for use in output MAE and RMSE have been improved.

In [12], the authors provided a recommendation system on users interest. They are more focusing on what users needs or wants when they use the e-commerce system. The system computes the user product purchasing, habits, products popularities and

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web navigation behaviour. The algorithm that they are focusing on is a Dynamic E-commerce recommendation system.

Three dimensional proximity recommendation system was proposed by authors in [13]. The advantages of this system is the algorithms is providing the proximity recommendations. The algorithms is used to generate a composite visual representation by embedding the prioritized recommendations into visual representations.

In [14], the authors propose a system for sustainable digital marketing that is a session-based recommendation system. This paper focuses on improving the performance of the recommendation system by considering item meetings and information about the attributes. You can recommend this element using the ISBR and the Attribute Session Accommenders (ASBRs). You can use this interface. They also suggested using function-weighted session-based (FWSBR) recommendations.

Authors in [15] is proposing the recommender system challenges and the solutions. In this paper, the make the comparison on content based, collaborative filtering, demographic and hybrid filtering. This recommendation system has their pros and cons. This research paper will help to choose which recommendation is suitable for the website that need to be used.

Authors suggested in [16] a personalized product suggestion on social media e-commerce pages. In this research paper, they build a high-effectiveness method to use a user's social media data to determine the appropriate keyword for the recommending system using the fuse logic technique.

The authors proposed in [17] a large-scale, deep-learning visual recommendation and e-commerce search project. In this analysis, the deep convolutional architecture of a neural network called Visit is more integrated. Our approach to image retrieval is shown to be superior by contrasting the exact data from street2shop.

Authors in [18] suggest that the e-commerce recommendation framework should be used for data mining. The aim is to recommend products more likely to be bought for the consumer in this research paper. The technique for the recommendation is also described. Next, a better way to explain the results and a good algorithm. This research focuses more on a mixture of algorithms with clustering algorithms.

A hybrid recommendation framework is suggested by the authors of [19]. In this article, the emphasis is more on a hybrid system of recommendations, which incorporates two or more approaches for recommendations. They also noted that most studies combine collaborative filtering with different technology. Moreover, the two traditions that address the most important issues are the cold start and data scarcity.

E-commerce recommendation system is proposed by authors in [20]. This research paper is more focusing in clustering and collaborating filtering algorithms. The authors give a more details on clustering and collaborative filtering which is clustering is the collection of data that have similar data while collaborative filtering where this filtering has 2 sense which is narrow one and more general one.

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C. Related Article Comparison

Serial	Year	Title	Author's Names	Significant of The Study	Highlights	Parameters Observes	Published at
1	2016	Dynamic Recommendation System for E-commerce users	Shivani Diwan, Komal Dani , Sahil Desai, Kalpashree Bal	Using Traditional Recommendation in aiming at exploring dynamic knowledge to e-commerce users	This project is focusing on the traditional recommendation techniques which in can enhanced manner , valuable patterns and hidden knowledge can be explored		Sciencedirect
2	2017	A Review on the Page Recommendation Model Using Machine Learning Approaches	Ramandeep Sharma, Samarth Kapoor	The algorithm will recommend the product based on ranking of the product	Recommendation by Ranking system (RS)	Web mining and Neural computing	IEEE
3	2017	Mobile e-Commerce Recommendation System Based on Multi-Source Information Fusion for Sustainable e-Business	Yan Guo, Chenexin Yin, Mingfu Li, Xiaoting Ren, Ping Liu	This Mobile e-Commerce recommendation system technically is more like improving the RBF function and also Dempster-shafer theory to make the e-Business more efficient and sustainable	Improved radial basis function (RBF) network to identified the recommendation and it also improved Dempster-shafer theory to blend with the multi-source information	Radial Basis Function and Dempster-Shafer theory	Researchgate
4	2018	Deep Learning based Recommender System: A Survey and New Perspectives	Shuai zhang, Lina Yao, Aixin Sun, Yi Tay	The utility of recommender systems cannot be overstated, given its widespread adoption in many web applications, along with its potential impact to ameliorate many problems related to over-choice.	Provide a comprehensive review of recent research efforts on deep learning based recommender systems		Google Scholar
5	2019	Intelligent Recommender System for Big Data Applications Based on the Random Neural Network	Will Serrano	Web users cannot be guaranteed that the products provided by recommender systems within Big Data are either exhaustive or relevant to their needs	Proposing Intelligent Recommender system. It is based on Random Neural Network		Researchgate
6	2018	Survey Paper On Dynamic Recommendation System For E-commerce	Vaishali Baipai, Yaeyapal Yadav	This recommendation system are useful for both e-commerce service provider and users which is the algorithm is learning by how the users interacting with the system.	They are using Hybrid recommendation algorithm to find user's behaviour and then similar user behaviour score is computed	Hybrid Recommendation algorithm	Google Scholar
7	2018	A trust-based collaborative filtering algorithm for E-commerce recommendation system	LiaoLiang Jiang, Yuting Cheng, Li yang, Hongyang Yan, Xiaoqin Wang	In this project , the recommendation algorithm is more on fusion of trusted data and user similarity which is it can be deployed in many type of recommender system	Finding the similarities of the users interaction with the website		IEEE
8	2017	A NoSQL Data-based Personalized Recommendation System for C2C e-Commerce	Tran Khanh Dang, An Khuong Vo, Josef Kung	They introducing an approach that recommends the E-commerce sites based on the item description	Recommending the items based on the item description which is what the customers need	Customer-to-Customer (C2C) E-commerce recommendation Algorithm	Researchgate
9	2017	Recommendation System for Ecommerce using Big Data	Prof. Alka Leekha, Shreyas Upadhye, Pratik Abire, Pranav Pawar	Improving the traditional algorithm into hybrid system by combining two or more recommendation techniques to get better content optimization	Combining all traditional algorithm to be a one hybrid algorithm	Content Based Collaborative Filter (CBCF)	Researchgate
10	2019	Smart e-commerce integration with recommender systems	Yin Zhang, Haider Abbas, Yi Sun	E-commerce system is assisted by cloud. It involved QoS and QoE so that the E-commerce system users will experience the significant improvement	Involving Cloud Computing into E-commerce system		Springer
11	2018	An Improved Collaborative Filtering Recommendation Algorithm and Recommendation Strategy	Xiaofeng Li , Dong Li	Mainly includes content recommendation technology, collaborative filtering recommendation technology, and hybrid recommendation technology	Improving collaborative filtering algorithm. Investigating the community detection algorithm. and two overlapping community detection algorithms based on the central node and k-based faction are proposed, which effectively mine the community in the community in the network. Lastly , to reduce the calculation time and increasing the recommendation speed and accuracy.	Improving collaborative algorithms for MAE and RMSE performance	reserachgate
12	2019	An Improved Dynamic E-commerce Recommendation System	Vaishali Baipai , Yangyapal Yadav	Provided Recommendations on the user's interest. In this context the web usage mining and the content mining with additional factors are proposed	Recommendation system computes the user product purchasing habits, product Popularities, and user's web navigational behaviour.	Dynamic E-commerce Recommendation system	Google Scholarship
13	2018	Three Dimensional Proximity recommendation System	Steve Yankovich, Ryan Melcher	The algorithms is providing the proximity recommendations.	The algorithms is used to generate a composite visual representation by embedding select prioritized recommendations into a visual representation.	The proximity recommendations	Springer
14	2019	Session-Based Recommender System for Sustainable Digital Marketing	Hyunwoo Hwangbo, Yangsok Kim	This paper is focusing on improvement of recommendation system's performance by considering item session and attribute session information.	They Suggesting the item by using Session-Based Recommender (ISBR) and the Attribute Session-Based Recommenders (ASBRs). They also suggesting by using Features-Weighted Session-Based Recommenders (FWSBRs)		Google Scholarship

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15	2019	Recommender System Challenges and Solutions	Marwa Hussein Mohamed, Mohamed Helmy Khafagy, ohamed Hasan brahim	In this paper, they make a comparison on Content based, collaborative filtering, demographic and hybrid filtering	These recommendation system has their pros and cons. This research paper will help to choose which recommendation is suitable for the website that need to be use		Researchgate
16	2019	Personalised Product recommendations on e-commerce websites with the use of social media	Pankaj Dutta, Hiren Rathod, Shanil Soni, Pratistha Chandra	In this research paper, they develop an algorithm to provide very effective recommendations using the social media data of a user	They using Fuzzy logic technique to find the relevant keyword	Fuzzy Logic Technique	ieomsociety.org
17	2017	Deep learning based large scale visual recommendation and search for e-commerce	Devashish Shankar, Sujay Narumanchi, Ananya H A, Pramod Kompalli, Krishnendy Chaudhury	They proposed a unified deep convolutional neural network architecture called VisNet.	They demonstrate the superiority of our approach for the task of image retrieval, by comparing against the state-of-the-art on the Exact Street2Shop dataset		Google Scholarship
18	2018	Application of Data Mining to E-Commerce Recommendation System	DR.P.V.R.D Prasad Rao, S.Varakumari, Vineetha.B, V.Satish	This research paper is aiming to recommend products to the user which is more likely to be purchased	Describing the technique for recommendation. Next is suggesting a better approach for a good algorithms and explain the results	Combination of K-means clustering algorithms and apriori algorithms	Researchgate
19	2017	Hybrid Recommender system : A systematic Literature Review	Erion Cano, Maurizio Morisio	Focusing on hybrid recommender system which is a combination of two or more recommendation strategies.	Most of the studies combining the collaborative filtering with another technique. Cold-start and data sparsity are the two traditional and top issues being addressed	Hybrid Recommendation system	Google Scholarship
20	2016	E-commerce Recommendation System	Akilesh Sherke, Ichchha Sharma, Pooja Pillai, Dhawal Daundkar	This research paper is more focusing in clustering and Collaborative filtering algorithm.	Clustering is the collection of data that have similar data while Collaborative filtering where this filtering has 2 sense which is narrow one and more general one	Clustering and Collaborative Filtering	IRJET

III. METHODOLOGY

a) Agile Development Method

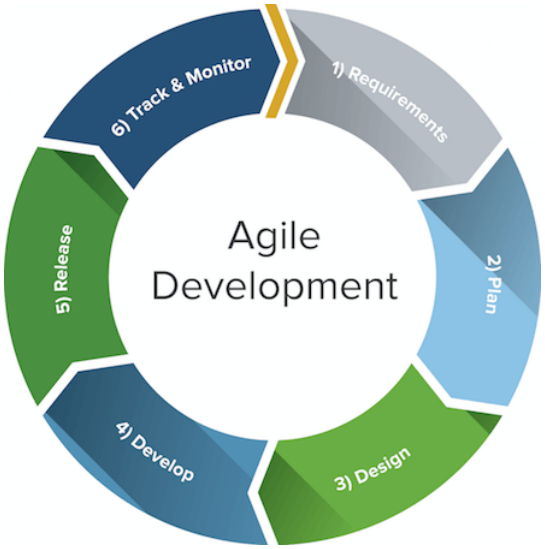

Figure 1:- Agile Development

The approaches can be defined as a process or combination of techniques for collecting information and data to achieve an effective method for preparing, designing and delivering a project. It also uses this approach in every point of project development as a framework for solving the problem. Agile is one of those. Agile methodology, based upon the Agile Manifesto's four core principles. These methodologies are rooted in adaptive planning, early delivery, and continuous improvement, all of which can quickly and easily respond to change.To do this, agile consists of fast development periods, also called sprints. Agile can be suitable for projects that require less coordination and communication in real-time. Thus, agile adjustments throughout a project are strongly recommended. It is mostly used in software development projects as it makes it easier to find problems and make adjustments early in the development process, instead of waiting for the evaluation. Further development teams are, however, implementing an Agile method, testers struggling to follow this step. The general acceptance of Agile has contributed to more regular launches of issues and unfinished applications. This method has tested a

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method that is adequate to test and conduct the project after testing by developers.

b) Flowchart

A flowchart that consist the process from three different aspects which is the vendor, customer & user. The flowchart explain on how does the system works. We can see that while the user enters the website, the recommendation algorithm will be running along the system. However, we can see the system will keep on looping if the match of recommendation did not match the user preferences. Hence, the admin can access both side vendor and user. However, due to the limitation of project, vendor section and recommendation algorithm part can't be done due to lack of understanding of this project. Figure 2 shows the flowchart structure of this project that has been planned.

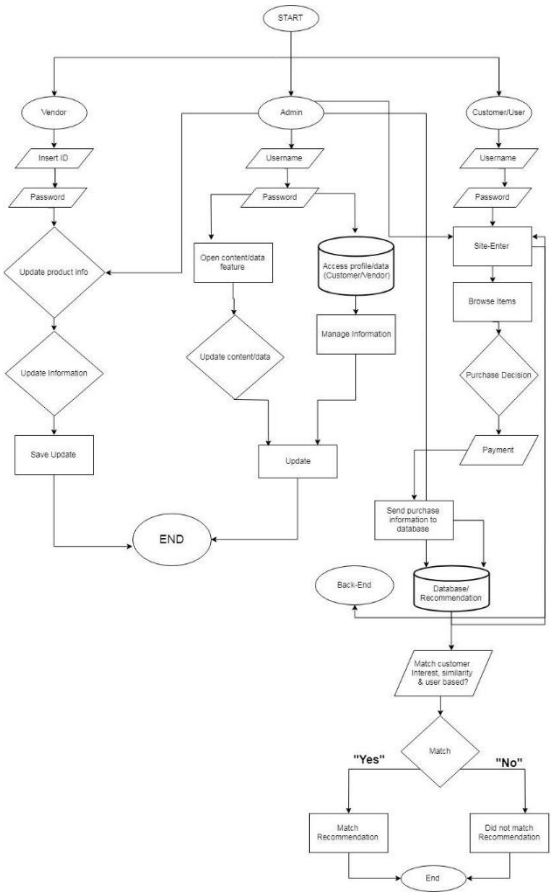

Figure 2:- Flow Chart

IV. RESULT AND DISCUSSION

a) Introduction

As we know, an e-commerce website is known as an online platform where there is an activity of selling and buying goods and services over the internet. E-commerce business is ruling the world in the current trend. However, e-commerce business has become a common thing among the people today. Whenever they need to buy or sell things, they only need to register and enter the website online. In this project, developing an e-commerce website that has basic capabilities is one of the objectives. It wants to ensure that the website that has been developed for this project has the basic things and works as a basic e-commerce website. Before entering the website, it required to open Windows PowerShell. Windows PowerShell where it needs to enter certain commands to generate the development server URL to access the website. Users can access the website by entering the localhost address that has been given. For example, 127.0.0.1:8000.

b) E-commerce Website

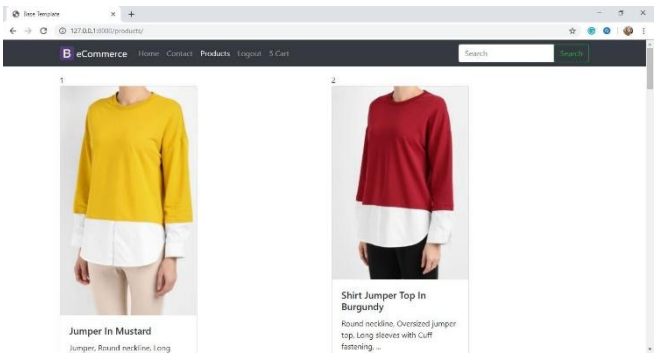

Figure 3:- Product Page

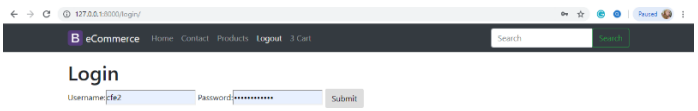

Figure 4:- Login/Logout Page

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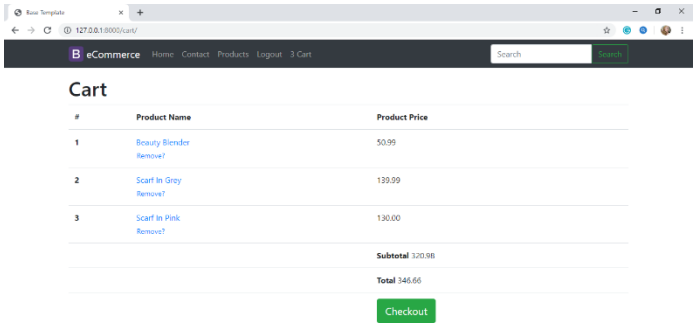

Figure 5:- Cart Page

c) Recommendation Algorithm

In today's world, e-commerce is a common thing for people to buy goods and services. Besides, it is a good platform for companies to make an income and gain their revenue. A system that helps companies to enhance the financial growth and revenue in an e-commerce are recommendation algorithm. Besides than gain revenue, recommendation algorithm also makes users satisfaction whereby users or customers then to look for their product recommendation from feedback, previous browsing and also when the recommendation algorithm to suggest a product that related to their preferences. In this way, users or customers will come to the website several of times and enhance the company growth even more. Unfortunately, in this project, we can't achieve this objective due of several reasons. The coding to create the algorithm already been created and the framework is there.

(1) Reason due unaccomplished system.

i) Lack of related knowledge.
ii) Misunderstanding the interactions between the program and the environment.
iii) Design error in software components.

In this project, it used anaconda navigator where the jupyter notebook work as the web-based for recommendation algorithm code to run.

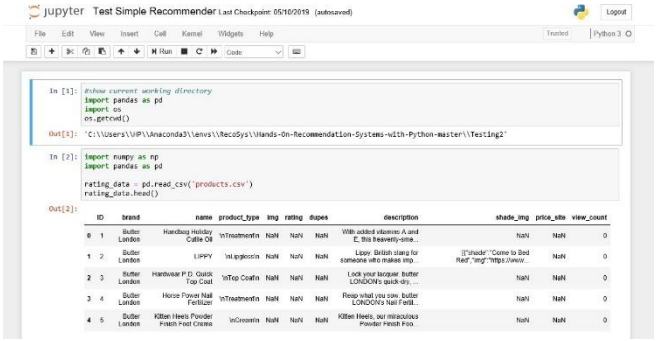

Figure 3:- Simple Recommender Generated Table

Figure 3 shows the recommender code generated the table for product details. This is one of the systems in recommendation algorithm that can generate product details based on criteria. This system mainly will run on the data once it works on the website as per our design.

V. CONCLUSION

As a conclusion, this paper is focusing on providing the best hybrid algorithm to all users of an ecommerce site. Recommender system is a part of the machine learning, which is it will automatically learn from the customers behaviour toward ecommerce site rather than the predefined data. We also discuss the advantage and disadvantages of the algorithms when using the recommendation system to the customers. This recommendation system are ongoing hot topics in the recent decades. This system has highly potential to gain new customers or new buyers and keep the existing one.

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