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Smart Cart Application for E-Commerce Websites: A Case Study

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Abstract: In the past few years, customers' buying habits have changed a lot because of e-commerce. E-commerce systems have a lot of benefits over traditional ways of selling things in stores because they can be changed to fit the wants and tastes of each user. Personalizing these experiences has the ability to make customers happier, which could increase sales and make platforms more successful. In sales of things like computers, users often put together a product based on its parts in a way that suits their personal tastes. To successfully plan inventory management, pricing strategies, and marketing efforts, it is very important to be able to correctly predict which product combinations will be the most popular. This position paper is focusing on how to build a decision support system software that can predict the likelihood of a buy for product baskets that are put together on the fly. The main goal of this decision support system software is to help e-commerce companies better understand what customers want and adjust their tactics to meet those needs. By designing, building and using this software, e-commerce companies can learn more about how their customers behave and increase their sales.

Keywords: E-commerce systems, Intelligent smart cart applications, Decision support system

Introduction

E-commerce sites are becoming more popular because technology is getting better and digitization is making things easier. But one thing that makes these sites successful is how the user experience is personalized and changes over time. When it comes to goods with multiple parts, like computers, offering the right combinations serves a double purpose: it makes customers happier and boosts sales.

E-commerce sites try to stay relevant in a market that is becoming more international and where competition is strong. Those sites that stand out from the crowd do so by giving their users a unique, personalized experience. By highlighting goods and services that match a user's tastes, personalization makes it more likely that they will buy. In particular, the likelihood of a sale goes up by a lot when a customer's wants and needs are taken into account when putting together a product basket. How well these personalized experiences work depends directly on how well the tools and methods used to make them work. When selling products with multiple parts, like computers, offering the right setup and adding it to an automatically created shopping cart has a big impact on customer happiness and sales data.

For e-commerce platforms to be more successful, they need decision support systems that can predict how likely it is that a customer will buy a product basket that is created on the fly. These systems help platforms boost their sales and give customers a more personalized and satisfying shopping experience. But for such a system to work well, it needs to use specific techniques and methods. This position paper is about the design and development of a decision support system for e-commerce platforms that can predict how likely it is that a customer will buy

a product basket that is produced on the fly. Also, a detailed explanation of the methods used, the technical problems that came up, and how they were solved is discussed in this position paper.

Motivation: Due to the changing nature of the business world today, it's important to have strategies and tools that can target specific clients. The lofty goal of this project is to create and build a decision support system that is just right for sellers. The most important job of this system is to guess whether a buyer will buy a product basket that is put together on the fly. We'll talk about what made us want to do this study below.

Complex Product Configurations: In computer goods, it is normal for dozens of different parts to be put together in a complicated way. Because of how complicated it is, it is possible to make thousands of different designs for sellers. So, it's clear and urgent that we need to come up with product sets that include the right combinations. Making the right mix is not just a matter of being able to do it, but also has big effects on sales success and partner happiness.

Highlighting Relevant Options: There are a lot of different ways to set up a computer, so it's important to find and highlight the ones that fit buyer tastes. One possible way to deal with this problem is to keep up with product design trends and carefully think about dealer needs. By taking these ideas into account, product baskets can be made in a moving way. But there is still a lot of uncertainty: after the product baskets are made, it's not clear if the sellers will like them and buy them.

Problems with Current Offerings: In the current way of doing business, it's common to approach sellers with product sets that are less likely to be bought. This way of doing things accidentally lowers the happiness of our dealer clients, which leads to a drop in sales. Such situations are not only missed chances, but they also hurt the brand's image and credibility in the eyes of key partners. In light of these problems, this project isn't just a technological effort; it's also a strategy move to fix structural errors, improve partner happiness, and increase sales potential.

Summary: To sum up, for e-commerce sites to do well in a competitive market, it's important to make the user experience unique and dynamic. This paper goes into great detail about how to build and use a decision support system that was made to meet this need.

Organization structure: This paper is put together in the following way: We start with the "Methodology" section, which explains in detail the methods and techniques used to figure out how likely it is that randomly produced product baskets will be bought. Here, we also discuss how this study is different from other research and what is new about it. The “Literature Review” section overviews the related literature. The "Expected Outputs and Benefits" section goes into detail about how this decision support system could help e-commerce sites and end users. Lastly, the "Conclusion and Future Work" section gives an overview of the study's results and talks about possible directions for future research. This style is meant to make it easy for readers to get around the study and focus on its most important parts.

Literature Survey

Wang et al. (2020) looked into how product recommendations on e-commerce sites change over time. Their study showed how suggestions are changing from being set and based on simple user choices to being dynamic and changing in real time based on how users browse and what they've bought in the past. Loukili et al. (2023) looked at how machine learning algorithms are becoming more and more important in predicting what people will buy. Their research showed how much prediction analytics can improve the customer experience and boost sales. Veres et al. (2023) looked into how clustering methods could be used to divide e-commerce markets into different groups. Their results showed that these kinds of systems are good at putting people into groups based on how they buy things, which lets marketers make more focused plans.

Punia et al. (2022) did a thorough study of how deep learning models, especially LSTM (Long Short-Term Memory) networks, can be used to predict sales. Their study showed that LSTM networks were better at predicting sales than standard time series models, especially in markets with a lot of different products, like computer sales. Almahmood et al. (2022) looked into the problems that e-commerce platforms have with putting together product carts on the fly. This job is hard because of things like real-time product changes, quickly changing customer tastes, and logistics. Chandra et al. (2022) looked into the direct link between personalized product suggestions and customer satisfaction. Their study showed that customers were more likely to buy and come back to platforms that suggested products that fit their needs. This shows how important personalized e-

commerce experiences are for businesses. Different web service-oriented architecture-based systems have been described that are made to solve problems in different fields (Aktas et al., 2005a, Aktas et al., 2005b, Aktas& Aydın, 2005a, Aktas& Aydın, 2005b). For example, Baloglu et al. (2010) looked into how web activity mining data is classified. The present project, on the other hand, finds its own area by focusing on a predictive system that figures out how well certain groups of products will sell. Some study has looked at how to structure datasets more effectively through data representation and embedding (Uygun et al., 2020; Olmezogullari & Aktas, 2022, Olmezogullari & Aktas, 2020). This project, on the other hand, uses transaction data to look at how people buy things. There have been some interesting studies (Sahinoglu et al., 2015; Kapdan et al., 2014) that look at how to judge the quality of software made during a project. However, this part of our project will arrive later. The current study also doesn't look at past user actions like other studies have (Tufek et al., 2018; Dundar et al., 2016; Baeth & Aktas, 2017). Instead, it plans to look at what users did in the past in a later study.

Methodology

The main goal of this study is to discuss how to create and implement a decision support system to meet the needs that have been listed in the introduction. This method is good at figuring out if sellers will buy a constantly put together basket of products. Here are some details about the tasks that will be done as part of the project:

Analysis, review of the literature, and project management tasks: Activities for the preliminary analysis include holding the first talks and making a list of the needs. Activities for Technical Analysis and Design: Figuring out what kind of technical equipment is needed based on the needs. After comparing the project's results to those of competitors, the right methods and techniques are chosen. Activities for the Literature Review: During the analysis and idea confirmation studies, academic advice from the university will be used to do a thorough analysis of the literature. Activities for project management include making project plans, holding weekly project meetings, and giving reports. After figuring out what the project needs, the planning part tries to come up with a plan for meeting these needs. The best method is one that is flexible at every stage of the job.

Software design Determination Activities: Getting ready for the project's software design. Setting up the technical infrastructure and environment: Platform Creation Activities: Tasks linked to software development, server requests, database connections, server connections, and figuring out what the technology and software development infrastructure needs are. Setting up the data architecture for the software that will be made: Putting in place the data infrastructure that is needed. Scripts are made to collect raw data from different sources that will be used to make the project result. Design Activities: Finish the general design and specific design of the program. User interface ideas are done. Activities in software development include making software modules, working on the front end, integrating modules, and checking modules at the unit level.

Activities for the Functional and User Acceptance Tests: Functional tests include making functional test cases, running the tests, reporting errors, fixing the mistakes, and re-testing. User Acceptance Tests include setting up situations, running the tests, reporting mistakes, fixing the problems, and re-testing. Live Transition Activities: Making user papers, getting ready for the transition, planning the return, and finishing the transfer.

Key Points for Project Research: Methodology for Dealer Segmentation: By looking at what Casper's dealer clients have bought in the past, it is possible to find goods that have already been bought. A product profile vector can be made for each product, and the goods a dealer bought can be used to make a dealer profile vector. For example, a dealer's profile vector could be found by averaging the profile vectors of the goods they have bought in the past. Using different grouping analysis methods, this project will focus on putting sellers into groups based on their character vectors. Metrics like the v-measure and the Silhouette Coefficient will be used to judge the results of the segmentation.

Modeling with machine learning and deep learning to predict product basket purchases: Labeled product basket vectors will be used with supervised machine learning algorithms to predict how people will buy things. Different methods will be used, such as Logistic Regression, Winnow Algorithm, and SVM. Deep learning methods that use LSTM will also be looked into.

Data Preprocessing for Product Basket Vectors: As product sales go up over time, the amount of product basket vectors will go up. High-performance data preparation methods for each dealer section will be worked on as part of the project.

Classic machine learning (ML) algorithms and deep learning (DL) algorithms will both be used as binary predictors for purchase behavior. Different measures, like F-Score and Accuracy, will be used to compare the results of the algorithms.

Expected Outputs and Benefits

The main thing that will come out of this study is software for a decision support system. This software is good at figuring out how likely it is that sellers will buy a constantly put together basket of products. Benefits expected: When the project is done, there will be a number of benefits, which can be put under different headings: Gains for the Company: Expertise in research and development: The research and development (R&D) efforts in this project will help our company learn a lot, especially about group analysis and machine learning/deep learning methods. Adding to our product line: As a result of this project, our company will have a decision support system software that can estimate the chance that a product basket will be bought, which will add to our current line of products.

Skill Improvement: The software that comes out of this project will give engineers in our country more information and experience that will help them become more skilled in this area.

Contribution to Global Academic Literature: The research and development work done for this project will be published at international conferences and in international papers. This will make a big contribution to the global academic literature in the field. From this study, a decision support system should be made that will help companies improve their sales tactics and make their customers happier. These improvements are expected to help the company make more money. This project will only work if the following conditions are met:

Probability to Buy Prediction: The system should be able to predict with at least 90% accuracy how likely it is that a product basket will be bought. Success in Dealer Segmentation: The accuracy of dealer segmentation should be at least 90%. Response Time of Software: The response time of the software should never be longer than 5 seconds.

Results and Future Work

With the introduction of dynamic product assembly and its following buy likelihood predictions, e-commerce has changed in a big way, especially in the computer sales market. The results of this study not only show that such a method is possible, but also show how it could change how businesses think about making sales strategies in a market that is becoming more digitalized. Methodological accuracy is one of the most important strengths of this study. By using both grouping techniques and machine learning or deep learning methods, the system has a detailed knowledge of how dealers act and what they like. This method makes sure that the product boxes are not just thrown together, but are carefully put together to meet the wants and preferences of the potential buyer.

Also, the measuring measures set for this project, such as a minimum forecast accuracy of 90% for the chance of buying a product basket and the success of dealer segmentation, along with the strict software response time, show how efficient and strong the system is. When these standards are met, it shows not only that the system is technically sound, but also that it has the ability to bring about real business results. But even though what we know now is hopeful, there is a lot more to find out. In future study projects, more can be done to improve the methods used. For example, more complex neural network designs or real-time data sets can be added to increase the dynamic nature of product basket forecasts. Also, the system's formulas can be updated periodically to keep up with changing market trends. This keeps the system accurate and up-to-date. The system's ability to grow and change is another area where more work could be done. Even though the focus has been on selling computers so far, the system's basic ideas could be used in other areas as well. With some small changes and adjustments, the system could be made to work with different e-commerce sites that sell different kinds of products. This kind of flexibility can help drive sales and improve customer happiness in many different industries.

In the end, this study has made it possible for e-commerce sales to be more data-driven, specialized, and efficient. Combining cutting-edge business methods with real-world business needs has led to a system that claims to have both academic and real-world effects.

Scientific Ethics Declaration

We declare that the ethical and legal scientific responsibility for this article published in the EPSTEM journal lies with the authors.

Acknowledgments or Notes

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