

MODELS AND SOFTWARE SOLUTIONS FOR ONLINE SHOPPING PERSONALISATION BASED ON ARTIFICIAL INTELLIGENCE

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In today's world of information technology, e-commerce has become an integral part of the economic environment. The growing popularity of online commerce requires constant adaptation of online stores to the needs of consumers. The relevance of this study lies in the prospects of artificial intelligence technologies, specifically recommender systems that adapt to user preferences, improving the product selection and purchase process. Such systems analyse data on purchases and user behaviour to provide personalised recommendations, which helps to improve the user experience and increase conversion rates.

The study examines the key aspects of designing and developing software for an online store with elements of personalised online shopping based on artificial intelligence. The main focus is on the personalisation of the process of purchasing goods and modern models of recommendation systems. The aim of the work is to increase the conversion rate of an online store by improving the customer experience.

Modern consumers face difficulties in making choices due to the overwhelming number of available products, so there is a growing need for personalisation tools. According to the "McKinsey Next in Personalisation 2021", 71% of consumers expect personalisation, and 76% are disappointed when it is not provided [1]. Basic tools such as filtering, sorting and searching help consumers find products that match their preferences. Artificial intelligence, data analytics, and recommender systems play a key role in providing a convenient and personalised shopping experience that increases the competitiveness of online retailers and customer satisfaction.

Recommender systems use different algorithms, including collaborative filtering, which analyses the relationships between users and products, content filtering, which takes into account content characteristics, and hybrid methods. While collaborative filtering between users is effective, it has scaling issues: finding a user's neighbours takes $O(|U|)$ time. To extend collaborative filtering to the large number of users and make it easier to deploy on e-commerce websites, a more scalable algorithm was developed – item-based collaborative filtering, which is one of the most commonly used today. The cosine similarity between product rating vectors is the most popular similarity metric because it is simple, fast, and gives good prediction accuracy in the algorithm where items are compared.

Content-based filtering suggests items based on their attributes and user preferences. Many such systems use search models such as keyword matching or TF-IDF weighting (1). TF-IDF (Term Frequency-Inverse Document Frequency) takes into account terms that occur frequently in one document but rarely in others, considering them more relevant [2].

$$TF - IDF(t_k, d_k) = TF(t_k, d_k) \cdot \log \frac{N}{n_k}, \quad (1)$$

where N is the number of documents in the corpus, and n_k is the number of documents in the collection in which the term t_k occurs at least once.

Fig. 1 shows a BPMN diagram of business processes to describe the main interaction between the store customer and the software.

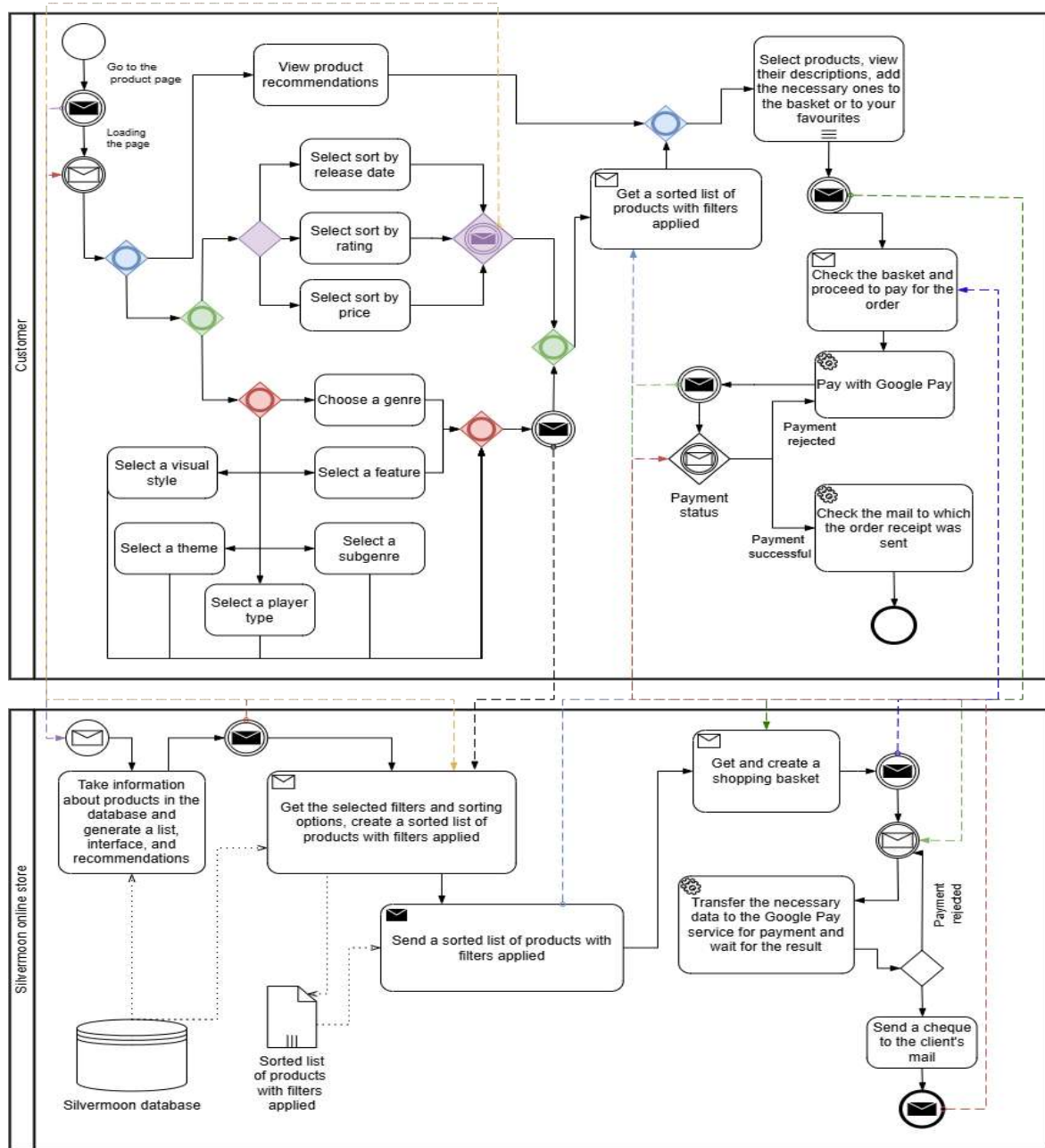


Fig. 1 – Business process diagram showing customer-software interaction

Thus, the research and development of models and software solutions for personalisation of online shopping based on artificial intelligence will increase the efficiency of interaction between e-commerce platforms and customers, leading to higher sales. In general, the results obtained indicate the prospects of integrating personalised online shopping elements based on artificial intelligence into the structure of online stores.

References:

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