

Ontology-based Conversation Recommender System for Camera using Collaborative Filtering

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Abstract— In this digital age, cameras have become one of the most popular electronic items in the technology market due to their diverse uses. However, potential buyers often need help in choosing a camera that matches the required camera specifications. By using ontologies, this system will provide accurate and personalized camera recommendations. However, the challenges include creating a suitable ontology, updating the ontology regularly, and limited camera data. To address these issues, we propose an ontology-based camera recommender system that not only provides accurate and personalized guidance to users but can also provide added value to camera manufacturers in increasing product sales. Furthermore, this research introduces a knowledge ontology update and implementation of the Conversational Recommender System (CRS) framework in the camera domain, we propose using a collaborative filtering method to improve the recommendation accuracy. The results are expected to provide better guidance to users in selecting cameras according to their functional needs. We measured both system performance and user satisfaction levels in the evaluation process. Based on the evaluation results, the accuracy of the proposed system is 88.17%. This result is better than previous research that only relies on ontology.

Keywords— camera recommender system, conversational recommender system, ontology-based recommender system, collaborative filtering

I. INTRODUCTION

In an era dominated by technological advancements, especially in the world of photography, digital cameras have become an indispensable tool [1]. Along with the development of technology and the internet, the impact is also very much felt in the aspect of photography, affecting how people work, communicate, and share their work [2]. However, with the variety of camera types and specifications available, most people often need help choosing a camera that suits their needs and preferences [3]. This factor is further complicated because most users may require a deeper understanding of the camera's technical specifications. Therefore, there is a need for a recommender system that can provide accurate and personalized guidance [4] to help users find a camera that suits their daily photography needs.

An ontology-based camera recommender system goes beyond boosting sales to improve consumer engagement by suggesting products aligned with users' practical needs, not just technical features. Recognizing the diverse understanding of technical details, the system provides recommendations based on functional requirements like commercial use, special effects, and nature photography. Camera manufacturers can form closer relationships with their consumers, cultivate long-term customer loyalty, and improve their brand image in the market.

Ontology is a knowledge representation with the OWL (Web Ontology Language) standard from the World Wide Web Consortium (W3C). It is a structured framework that systematically organizes and presents relationships and entities. Beyond its technical roots, ontology is widely applied, particularly in developing recommender systems. In various research papers, ontologies have significantly improved the intelligence of recommender systems by offering a formal and standardized method to model and understand domains. This structured approach enhances the extraction of meaningful insights, contributing to the effectiveness of recommendation algorithms and delivering more accurate suggestions for users [5].

CRS enhances user discussions through Navigation by Asking (NBA) and Navigation by Proposing (NBP). These techniques are integrated to provide a seamless and interesting communication [6]. This allows the system to smoothly switch between asking questions and suggesting products, creating a more engaging conversation with users and providing recommendations that truly match their needs. Recommender systems play a crucial role in helping consumers find things they like, and various methods like Content-Based Filtering (CBF), Collaborative Filtering (CF), and Hybrid approaches can be used in their development. While many studies have been conducted in this area, some needed more precision. In a specific example of Ontology-Based methods for camera recommender systems, Rachman and Baizal [7] they achieved an accuracy of 84.6%, showcasing the potential for improved recommender system performance.

This study proposes an updated knowledge ontology and implementation of the CRS framework [3], [8] on the camera domain based on functional requirements. In addition, we also incorporated a collaborative filtering method to improve the accuracy of our recommendations. This allows us to assist users in selecting the most suitable camera for their needs based on specific functional requirements.

II. RELATED WORK

As we move towards a more advanced digital era, the way humans interact with recommender systems is becoming more diverse and complex. To address this challenge, Conversational Recommender Systems (CRS) allow users to communicate with recommender systems in a natural and interactive way, similar to having a conversation with an assistant [9].

Guia et al. [10] have proposed the development of a hybrid recommendation system based on ontology in the field of e-commerce. This research combines the ontology approach with recommendation techniques to provide users with