Table 1. AI E-Commerce Use-Case

Use-case field	**Description**
Use-case name	Improve personalized search results
Subject area	AI-driven e-commerce search
Business event	A customer initiates a product search on an e-commerce platform, triggering the AI-driven search system to personalize results based on real-time user behavior and historical data.
Actors	Primary Actor: Online Shopper Supporting Actor: AI-based Search Engine
Use-case overview	This use-case describes how an AI-powered personalized search system enhances product search results based on user behavior, increasing relevance and conversion rates.
Preconditions	The e-commerce platform must have an AI-native search engine integrated. Users must have an active session and browsing history (e.g., past searches, clicks, and purchases).
Basic flow	1. The user enters a search query on the e-commerce website. 2. The AI-powered search engine analyzes the user's browsing history, purchase behavior, and session data. 3. The system applies clickstream analysis and large language models to refine search results. 4. Personalized search results are generated and displayed based on real-time user behavior. 5. The user interacts with the search results, leading to improved engagement and potential purchases.

Alternative flow	If a new user without prior data initiates a search, the system provides general search results but starts collecting behavior data for future personalization. If AI detects an anomaly (e.g., user searches for an irrelevant or unavailable item), it suggests related alternatives.
Termination outcome	The user successfully finds relevant products and completes a purchase. The user does not find a suitable product and exits the platform.
Conditions affecting termination outcome	Accuracy of AI-based personalization. Availability of relevant products. User's willingness to engage with personalized results.
Use-case description	1. The online shopper enters a product search query in the e-commerce website’s search bar. 2. The AI-powered search engine processes the query and retrieves relevant results based on the user’s past behavior, clickstream data, and purchase history. 3. The system ranks the search results, prioritizing products that align with the user’s preferences and real-time shopping behavior. 4. The online shopper views the personalized search results and clicks on a product of interest. 5. The system updates user behavior data based on interactions, improving future search accuracy. 6. The online shopper adds the product to the cart and completes the checkout process. 7. The system confirms the purchase and updates recommendation algorithms for future searches.
Use-case associations	AI-driven recommendation systems. Customer segmentation and profiling.

	Dynamic pricing optimization.
Traceability	Connected to user data management and analytics. Related to AI model training and improvement.
Input	Online shopper search queries. Online shopper browsing history and past purchase data.
Output	Personalized search results tailored to the user.
Usability index	Ranked high in customer satisfaction and business impact due to improved search relevance.
Notes	AI performance needs continuous refinement through A/B testing and feedback loops.