AI Agent Project Proposal

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1. What is the AI Agent you are building?

Agent Name: "Alexupport" – Amazon Product Support Assistant

Primary Function:
Alexupport is an AI-powered customer support agent designed to assist Amazon customers by responding to their product-related questions expressed in natural language. The agent leverages a large-scale dataset of real customer questions and verified answers to deliver fast, accurate, and experience-based support. It understands product-specific queries and uses natural language understanding and information retrieval techniques to generate responses grounded in actual customer feedback.

Another key functionality of Alexupport is its ability to guide the user by suggesting relevant follow-up questions based on the available information. For example, proactively asking: *"Would you like to know if this product works with accessories?"* or *"Do you want to see similar products with better battery life?".*

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2. Why is this AI Agent necessary?

On large e-commerce platforms like Amazon, there are massive volumes of customer reviews, product questions, and user-generated content, which makes it difficult for users to search for relevant information or specific details they care about. While this crowd-sourced knowledge is incredibly valuable, it's often hidden under a lot of noisy and outdated responses. Customers are left overwhelmed, or forced to contact human support for help.

The Alexupport AI agent is designed to solve this problem by providing users with easy access to the most relevant and trustworthy information from the dataset - including previously answered questions and verified user feedback, all through natural, conversational language. This AI agent offers a scalable alternative to human support by delivering instant responses at any time of day, helping users resolve uncertainty, compare products, and make faster purchase decisions.

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3. What dataset(s) will you use?

We will use the AmazonQA dataset from GitHub, its primary features are listed below. This ~4GB dataset is well-suited for our agent's objectives, as it contains over one million examples of real customer interactions and spans a diverse range of product categories.

Key features of the dataset include:

- **`questionText`** – A natural language question posed by a customer, such as *"Is this compatible with iPhone 13?"*
- **`questionType`** – Classification of the question as either *"yes/no"* or *"descriptive"*, which allows for targeted response generation strategies.
- **`review_snippets`** – A curated list of up to ten review sentences that are relevant to the question, extracted using information retrieval techniques
- **`answers`** – A list of community-generated answers to the question, each annotated with helpfulness metrics, allowing the model to prioritize more reliable responses.
- Additional metadata, including `category` (product type) and `is_answerable` (a boolean indicator for whether the question can be answered using the available review data). We use the `is_answerable` feature to filter the dataset for answerable-only questions, to ensure that the data used is accurate and reliable.

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4. What tasks will the AI Agent perform?

The core tasks performed by the agent allow it to support effective dialogue and enhance the overall customer experience. Upon receiving a new question from the user, the agent undertakes the following key operations:

1. **Question Refinement:**
   As a first step, the agent refines the user query so it will align better with the existing data in the database. This is also done to ensure we do not feed the model(s) with typos, inaccurate requests, etc. In addition, in case we already have some chat history, the input is enriched with the previous question-answer pairs to better identify relevant information in the following step.

2. **Information Retrieval:**
   After refining the user input, the agent conducts a targeted search within its knowledge base to locate the most relevant information related to the user's query. This retrieval step ensures that responses are grounded in real-world user experiences and verified data rather than generic or speculative content.

3. **Verification step #1 - is the question answerable?**
   After retrieving information from the database, it is important to check whether this data is relevant enough to produce a reliable answer. To this end, we use a verification module which determines if the refined user input can be answered using the retrieved data:
   a. If we can answer, moving to step 4
   b. Otherwise, terminating the process and returning a default “unanswerable” response.

4. **Answer Generation:**
   The agent synthesizes a response tailored to the specific question of the user using two separate modules:
   a. Answer generator - This module is used to answer the user’s input using the retrieved data
   b. Follow-up questions generator - This module is used to generate relevant follow-up questions to the user’s input. These questions are designed to guide users toward further useful information, or help them consider related product features or concerns.

5. **Verification step #2 - Is the answer relevant?**
   Similar to verification step #1, we now check if the generated answer is accurate and reliable enough:
   a. If it is, moving to step 6
   b. Otherwise, returning to the previous step (4a) to re-generate an answer. Because this case can be time- and resource-consuming, we limit the re-generation trials to 5.

6. **Returning the output and appending to chat history:**
   Finally, the agent returns the verified answer, along with the suggested follow-up questions, to the user. It also saves the question-answer pair to a history database, to allow for a continuous and context-aware dialogue with the user.

5. A high-level diagram of our AI Agent and its interactions

DrawIO link