

Customer Insight Agent Architecture

The Customer Insight Agent aims to analyze customer reviews and feedback for the purpose of improving product features and shaping marketing strategies. It collects feedback from multiple sources (e.g., online reviews, surveys, social media comments) and processes this data to identify recurring issues, positive sentiments, and actionable suggestions for product improvement or targeted marketing efforts.

1. Agent's Goal:

Goal:

The agent's higher-level task is to extract key insights from customer feedback, including:

- Sentiment analysis (positive, negative, neutral)
- Identification of recurring themes or issues
- Extracted product features, problems, and suggestions
- Summarized customer sentiment and recommendations for product development and marketing strategies

The ultimate purpose is to provide decision-makers (e.g., product managers, marketing teams) with an actionable summary of customer feedback to guide product and marketing strategies.

2. Agent's Tools:

The agent uses various text extraction and summarization tools to achieve the goal. These tools include:

1. Text Preprocessing:
 - Text Cleaning (removes noise like HTML tags, special characters, etc.)
 - Tokenization: Splitting the text into words or sentences.
 - Stopword Removal: Removing common words that do not contribute meaningfully (e.g., "and," "is," "the").
2. Text Extraction:
 - Named Entity Recognition (NER): Extracting key entities such as product names, features, or issues.
 - Keyword Extraction: Using TF-IDF to find important terms in the feedback.
 - Regular Expressions: To identify and extract product-related issues like "battery life," "slow performance," etc.
3. Sentiment Analysis:
 - Sentiment Detection: Classifying the sentiment of the review (positive, negative, or neutral) using pre-trained models like Hugging Face Transformers or any LLM.
4. Summarization:
 - Extractive Summarization: Summarizing long reviews to highlight key issues or suggestions.

- Abstractive Summarization: Generating a concise summary of a review that conveys the main idea, e.g., “The customer had issues with the battery and recommends improving it.”
5. Reporting & Visualization:
- Insights Report: The agent creates a detailed insights report that includes a sentiment analysis summary, identified issues, key suggestions, and a visualized sentiment trend over time.

3. Reasoning/Planning:

The Customer Insight Agent will need to chain these tools together in a logical manner. It will need to decide the most appropriate sequence of actions, manage ambiguity (e.g., multiple issues in one review), and generate actionable insights.

Step-by-Step Process (Flow Diagram):

1. Step 1: Preprocessing the Feedback
 - Input: Customer reviews (raw text).
 - Action: Clean the text, remove stopwords, and tokenize the text.
 - Output: Cleaned and tokenized text.
2. Step 2: Extract Key Information
 - Action: Run Named Entity Recognition (NER) to extract key entities such as product names and features.
 - Action: Use Regular Expressions or TF-IDF for keyword extraction to identify common issues (e.g., “battery drain,” “slow performance”).
 - Output: Extracted entities and key terms (issues, product names, features).
3. Step 3: Sentiment Analysis
 - Action: Apply Sentiment Analysis (VADER/TextBlob) to classify the sentiment of each review.
 - Action: Store sentiment results (positive, negative, or neutral) along with the review.
 - Output: Sentiment scores for each feedback document.
4. Step 4: Summarization
 - Action: Apply Extractive Summarization to generate key points or use Abstractive Summarization to summarize the review.
 - Output: Concise summaries of each feedback document.
5. Step 5: Insight Generation
 - Action: Aggregate sentiment scores to generate an overall product sentiment score.
 - Action: Identify the most common issues (e.g., "slow performance," "battery drain").
 - Action: Identify suggestions (e.g., "improve battery life," "offer more color options").
 - Action: Create a report with summarized insights and recommendations for product and marketing teams.
 - Output: Actionable insights report.

6. Step 6: Reporting/Visualization

- Action: Present insights through a dashboard or PDF report.
- Output: Sentiment trends, top issues, key suggestions, and other visualizations for stakeholders.

4. Memory (Optional):

The Customer Insight Agent may benefit from storing information across interactions to continuously improve its analysis. Memory could be useful in the following ways:

- Contextual Memory: If the agent is integrated into a system where it continuously processes new feedback over time, it could store historical feedback trends, sentiment shifts, and previous insights to track progress and compare new data with past results.
- Learning from Feedback: If the agent is connected to a feedback loop, it could refine its sentiment analysis model or summarization methods over time by storing customer responses about its accuracy. For example, customers could indicate whether a generated summary accurately reflects their opinions, allowing the agent to improve its models.
- Continuous Updates: The agent could keep a rolling memory of the most recent feedback, creating a dynamic report that evolves with incoming data.

Memory Storage Options:

- Local Storage (Database or File System): For storing feedback data and summary reports for future retrieval.
- External Cloud-Based Storage (e.g., AWS S3, Google Cloud Storage): For large-scale feedback storage.

Overall Summary:

Agent's Goal:

- Analyze customer feedback to generate insights for product improvement and marketing strategies.

Agent's Tools:

- Text preprocessing (cleaning, tokenization)
- Named Entity Recognition (NER)
- Sentiment analysis
- Extractive and abstractive summarization

Reasoning/Planning:

- The agent processes customer feedback in stages, starting from preprocessing, through sentiment analysis and entity extraction, to summarization and insight generation.

- Decisions on tool application are driven by feedback characteristics (e.g., if feedback is lengthy, summarization is applied).

Memory:

- The agent may store insights and data over time for continuous improvement or dynamic reporting.

This architecture allows the Customer Insight Agent to efficiently process feedback, extract actionable insights, and generate reports to inform decision-making in product development and marketing strategies.

