CurePulse Project Documentation

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1 Introduction

CurePulse is an advanced AI-powered application developed to anticipate and measure customer satisfaction while monitoring and evaluating agent performance. The system provides in-depth analysis of recorded calls based on multiple factors, enabling the Client Services department to gain valuable insights into both client interactions and agent performance.

2 Purpose

The primary objective of CurePulse is to ensure high-quality client service by analyzing calls made to and from the department. The system evaluates various aspects of these calls to provide actionable insights that can be used to improve both client satisfaction and agent efficiency.

3 Features and Analysis

CurePulse offers comprehensive analysis capabilities, divided into two main categories:

3.1 Client Analysis

For clients, CurePulse focuses on:

- **Tone Analysis**: Identifies the emotional tone of the client during the call, categorizing it into positive, neutral, or negative.
- **Text Sentiment Analysis**: Evaluates the sentiment of the client's spoken words using Natural Language Processing (NLP) techniques, providing a sentiment score that reflects their satisfaction level.

3.2 Agent Analysis

For agents, CurePulse performs the following analyses:

- **Tone Analysis**: Determines the emotional tone of the agent during the interaction, categorizing it into positive, neutral, or negative.
- **Text Sentiment Analysis**: Assesses the sentiment conveyed by the agent's spoken words, providing a sentiment score that helps evaluate their performance.
- **Accent Detection**: Identifies the accent of the agent to ensure proper communication with clients, with metrics indicating the clarity and consistency of the detected accent.
- **Language Detection**: Detects the language used by the agent, ensuring it matches the client's preference. Metrics include the accuracy and fluency in the detected language.
- **Hold Time Analysis**: Measures the duration an agent places a client on hold, providing metrics such as average hold time and total hold time per call, which are critical for evaluating efficiency.

Model	Model Type	Accuracy
Language Model	LSTM + SVC	80%
Text Sentiment Model	BERT	85%
Tone Analysis Model	BERT	81%
Accent Detection Model	BERT	87%

Table 1: Accuracy of CurePulse Models

4 Data Collection and Storage

CurePulse collects data from recorded calls, which are stored securely in a central database system. The data storage and processing structure include:

- **Call Data Storage**: All raw call data, including audio files and transcriptions, are stored in a MongoDB database. MongoDB's flexibility allows for efficient storage and retrieval of unstructured data, which is ideal for handling the complex data generated by the calls.
- **Dashboard and Reporting**: The analysis results are presented through an interactive dashboard hosted on Apache Superset. Superset is connected to a PostgreSQL database, which stores the processed metrics and analysis summaries. PostgreSQL's robust relational capabilities provide efficient querying and reporting for the dashboard.

5 Call Retrieval from VoIP CCR

CurePulse retrieves calls through two primary links from the VoIP CCR system. The calls are fetched based on specific criteria, and the date parameter is updated daily.

5.1 VoIP CCR Links

The following links are used to fetch call records:

- **Link 1 (Incoming Calls):**

```
http://voipccr/ccr/api/CallsRecordNew?token=
2wdWewOiXwGxOfF0lwN91646816540058&date=24-08-28&call_status=
ANSWERED&incoming=true
```

- **Link 2 (Outgoing Calls):**

```
http://voipccr/ccr/api/CallsRecordNew?token=
2wdWewOiXwGxOfF0lwN91646816540058&date=24-08-28&call_status=
ANSWERED&
```

5.2 Daily Date Update

The ‘date‘ parameter in the URLs above is updated daily to ensure that the system retrieves the latest call records. This automated process ensures that CurePulse consistently analyzes the most recent calls. The date format followed is **YY-MM-DD**.

6 System Architecture

The system is built on a robust architecture that ensures scalability and reliability. It consists of the following components:

- **Data Ingestion**: Recorded calls are ingested into the system and stored in the MongoDB database.
- **Processing Engine**: AI models analyze the calls for tone, sentiment, accent, language, and hold time.
- **Dashboard**: The dashboard, hosted on Apache Superset and backed by a PostgreSQL database, displays the results of the analyses, providing actionable insights to the Client Services department.

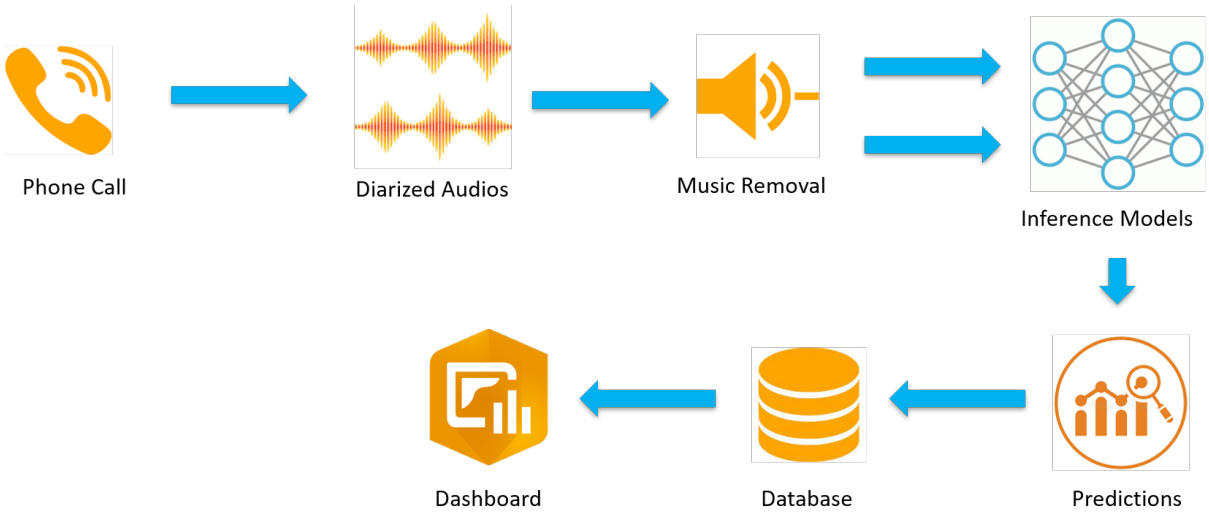

Figure 1: CurePulse System Architecture

7 Data Flow and Processing

CurePulse processes data through several key stages:

- **Call Ingestion and Storage**: Incoming and outgoing calls are recorded and ingested into MongoDB for storage.
- **AI Processing**:
  - **Tone and Sentiment Analysis**: Analyzes the tone and sentiment of both clients and agents, providing categorical and numerical scores.

  - **Accent and Language Detection**: Assesses the agent's accent and language, ensuring they align with the client's preferences.
  - **Hold Time Analysis**: Measures and logs the hold time to evaluate agent efficiency.

- **Data Output**: The processed data is stored in PostgreSQL and displayed on the Superset dashboard.

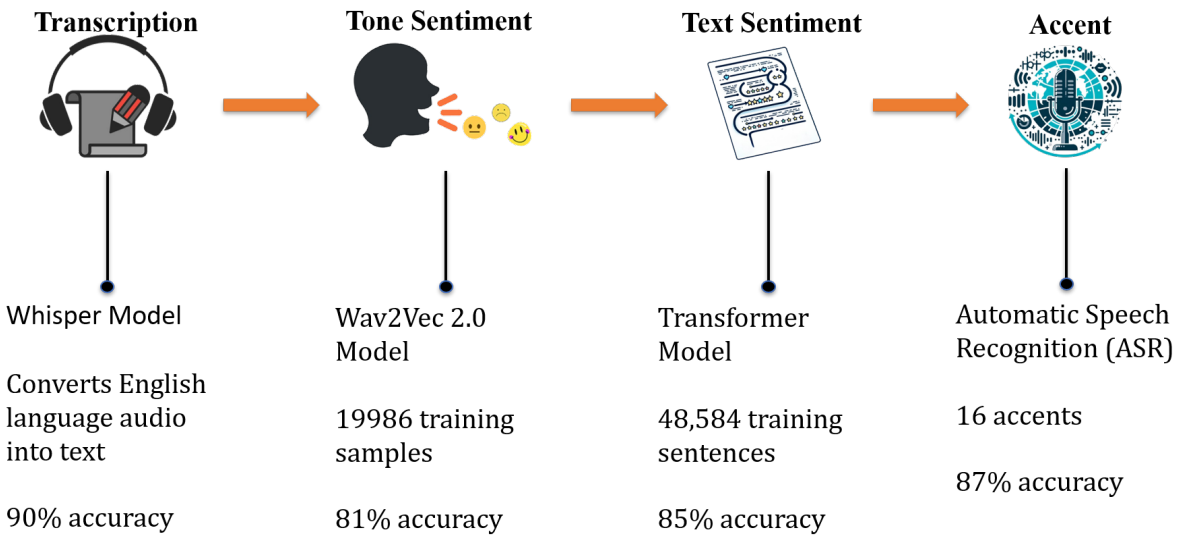

Figure 2: Data Flow and Processing in CurePulse

8 Client and Agent Metrics

CurePulse generates detailed metrics to assess both client satisfaction and agent performance:

8.1 Client Analysis Metrics

- **Tone Analysis**: Categorizes emotional tone as positive, neutral, or negative.
- **Sentiment Analysis**: Provides a sentiment score based on text analysis.

8.2 Agent Analysis Metrics

- **Tone and Sentiment Analysis**: Measures emotional tone and provides a sentiment score.
- **Accent Detection**: Identifies and assesses the clarity and consistency of the accent.
- **Language Detection**: Detects the language and evaluates fluency.
- **Hold Time Analysis**: Provides metrics like average and total hold time.

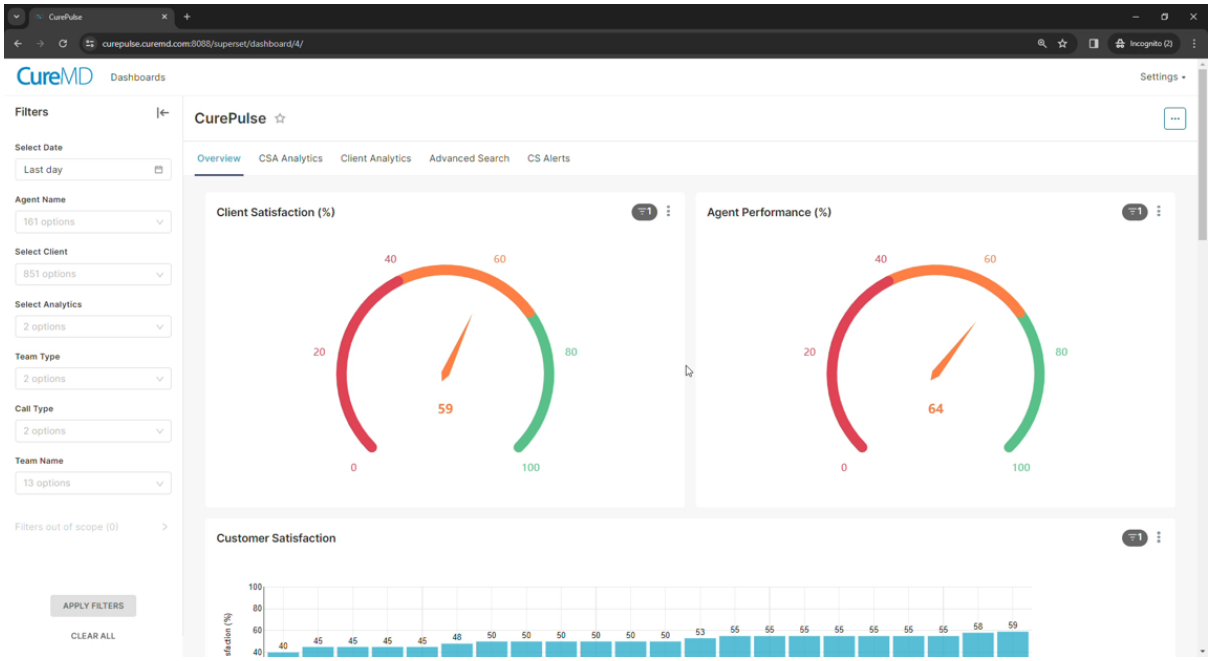

Figure 3: Metrics Visualization on CurePulse Dashboard

9 Star Rating Calculation and Final Score Determination

CurePulse utilizes a detailed scoring system to evaluate various aspects of both client satisfaction and agent performance. The star ratings for different models are calculated based on specific criteria, and the final score is determined using weighted averages. Below is a breakdown of how these ratings are calculated:

9.1 Star Rating Calculation

9.1.1 Language Model

The star rating for the language model is determined based on the following criteria:

- **5 Stars:** model score ≥ 68
- **4.5 Stars:** $65 \leq$ model score < 68
- **4 Stars:** $62 \leq$ model score < 65
- **3.5 Stars:** $58 \leq$ model score < 62
- **3 Stars:** $52 \leq$ model score < 58
- **2 Stars:** $49 \leq$ model score < 52
- **1 Star:** model score < 49

9.1.2 Text Sentiment Model

The star rating for the text sentiment model is based on the distribution of sentiment scores:

- **1 Star:** model score negative ≥ 0.35
- **2 Stars:** $0.2 \leq$ model score negative < 0.35
- **3.5 Stars:** ($0.8 \leq$ model score neutral) and (model score positive ≤ 0.1)
- **4 Stars:** $0.25 <$ model score positive ≤ 0.33
- **4.5 Stars:** $0.33 <$ model score positive ≤ 0.4
- **5 Stars:** model score positive > 0.4

9.1.3 Tone Analysis Model

The star rating for tone analysis is derived from the following conditions:

- **5 Stars:** (model score negative ≤ 0.10) and (model score positive ≥ 0.95)
- **4.5 Stars:** (model score negative ≤ 0.10) and ($0.90 \leq$ model score positive < 0.95)
- **4 Stars:** (model score negative ≤ 0.10) and ($0.85 \leq$ model score positive < 0.90)
- **3.5 Stars:** (model score negative ≤ 0.10) and ($0.75 \leq$ model score positive < 0.85)
- **3 Stars:** ($0.10 <$ model score negative ≤ 0.20) and ((model score positive + model score neutral) > 0.8)
- **2 Stars:** $0.3 <$ model score negative ≤ 0.55
- **1 Star:** model score negative > 0.55

9.1.4 Accent Detection Model

The star rating for accent detection varies depending on the detected accent:

- **US Accent:**
  - **5 Stars:** model score ≥ 0.8
  - **4.5 Stars:** $0.73 \leq$ model score < 0.8
  - **4 Stars:** $0.7 \leq$ model score < 0.73
  - **3.5 Stars:** $0.65 \leq$ model score < 0.7
  - **3 Stars:** $0.3 \leq$ model score < 0.65
- **England Accent:**
  - **4 Stars:** model score ≥ 0.72
  - **3.5 Stars:** $0.65 \leq$ model score < 0.72

- **3 Stars:** $0.5 \leq$ model score < 0.65
- **2 Stars:** model score < 0.5

- **Other Accents:**
  - **3 Stars:** $0.3 <$ model score ≤ 0.5
  - **2 Stars:** $0.5 <$ model score ≤ 0.65
  - **1 Star:** model score > 0.65

9.2 Final Score Calculation

The final score for both agents and clients is calculated using a weighted average of the individual model scores. The weights applied to each model are as follows:

9.2.1 Agent Final Score

- **Speech Model Weight:** 0.3
- **Text Model Weight:** 0.2
- **Grammar Model Weight:** 0.1
- **Accent Model Weight:** 0.2
- **Client Decision Weight:** 0.1
- **Music Average Weight:** 0.1

9.2.2 Client Final Score

- **Speech Model Weight:** 0.3
- **Text Model Weight:** 0.3
- **Music Average Weight:** 0.2
- **Music Duration Weight:** 0.2

The final score is calculated by summing the products of each model's score and its corresponding weight. The result is a percentage that represents the overall performance rating.

10 Access and Usage

CurePulse is accessible via the following link:

`https://curepulse.curemd.com:8088/superset/dashboard/4/`

10.1 Login Credentials

Authorized users can access the system using their corporate login credentials. Access is restricted to ensure data privacy and security.

- **Admin Username**: curepulse.admin
- **Password**: Q9&xZ#7P

10.2 Dashboard Features

The CurePulse dashboard provides a range of features:

- **Client Satisfaction Scores**: Visual representation of client sentiment and tone analysis, showing overall satisfaction trends.
- **Agent Performance Metrics**: Detailed insights into agent performance based on tone, sentiment, accent, language, and hold time. Metrics include average sentiment score, average tone score, hold time efficiency, and language fluency accuracy.
- **Call Summaries**: Summarized data of each call, including key metrics and analysis results, which can be filtered by agent, client, or date range.

11 Conclusion

CurePulse is a critical tool for the Client Services department, offering detailed analyses that help improve both client satisfaction and agent performance. The insights provided by CurePulse enable the department to take proactive measures, ensuring that clients receive the best possible service.