

Serverless Sentiment Analysis of Social Media Data Using AWS Comprehend

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Submitted by

2210030417: C Shashank

Under the guidance of

Ms. P. Sree Lakshmi



Department of Computer Science & Engineering

Koneru Lakshmaiah Education Foundation, Aziz Nagar

Aziz Nagar – 500075

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Introduction

Social media platforms like Twitter, Facebook, and Instagram generate massive amounts of text data daily. Understanding public sentiment from this data is crucial for businesses, organizations, and researchers to analyze opinions about products, services, or events. **Serverless Sentiment Analysis using AWS Comprehend** provides an efficient and scalable way to process social media text without managing infrastructure.

The system works by collecting text data from social media and sending it to **AWS API Gateway**, which routes the requests to **AWS Lambda** functions. These functions process the text and pass it to **AWS Comprehend**, which classifies the sentiment as positive, negative, neutral, or mixed. The results are then stored in **AWS DynamoDB or Amazon RDS** for further use.

Using a serverless approach ensures automatic scaling, reducing operational costs while maintaining high availability. Since AWS Lambda only runs when needed, the system is cost-efficient and eliminates the need for dedicated servers. This setup is ideal for brand monitoring, customer feedback analysis, and social media trend tracking, helping businesses make informed decisions.

By leveraging AWS services, this system provides real-time, secure, and reliable sentiment analysis, making it a valuable tool for analyzing public opinions efficiently and at scale.

Architecture Overview:

- **Frontend (React/Flutter/Web App)** → Sends text data from social media to API Gateway.
- **API Gateway** → Routes HTTP requests to AWS Lambda.
- **AWS Lambda (Python)** → Processes text data and sends it to AWS Comprehend.
- **AWS Comprehend** → Analyzes sentiment (Positive, Negative, Neutral, Mixed).
- **DynamoDB / Amazon RDS** → Stores sentiment results for further analysis.

Literature Review/ Application Survey

AWS Comprehend in Different Industries

[1] Sprinklr – Improving Customer Experience

Overview

Sprinklr is a platform that helps businesses connect with customers on social media, websites, and other digital channels. AWS Comprehend makes it easier to understand customer opinions and improve services.

How AWS Comprehend Helps Sprinklr

(a) Customer Support Sentiment Analysis

- Sprinklr uses AWS Comprehend to analyze customer support messages and social media posts.
- It sorts messages into positive, negative, neutral, or mixed categories.
- This helps businesses understand customer feelings and improve their support teams.

(b) Social Media Monitoring

- AWS Comprehend helps Sprinklr track brand mentions and customer feedback.
- Businesses can see how people feel about their products in real-time.
- If there is a problem, companies can respond quickly to protect their reputation.

(c) Filtering Bad Content

- AWS Comprehend helps Sprinklr detect offensive or inappropriate content.
- Harmful posts are flagged and removed automatically.
- This keeps the online space safe and positive for users.

(d) Market Research and Customer Trends

- AWS Comprehend finds common topics and customer interests from messages and reviews.
- Businesses can use this information to create better products and marketing campaigns.

[2] HubSpot – AI in Customer Relationship Management (CRM)

Overview

HubSpot is a tool that helps businesses manage customer relationships. AWS Comprehend improves HubSpot's ability to analyze customer feedback, automate support, and boost sales.

How AWS Comprehend Helps HubSpot

(a) Understanding Customer Emotions in Emails and Chats

- HubSpot uses AWS Comprehend to analyze customer emails, chats, and support tickets.
- It detects whether messages are positive or negative so businesses can respond quickly to unhappy customers.

(b) Analyzing Customer Reviews and Surveys

- AWS Comprehend helps businesses process and understand customer reviews.
- Companies can see what customers like or dislike about their products.
- This helps improve products and customer service.

(c) Finding the Best Customers for Sales

- AWS Comprehend analyzes customer messages to find potential buyers.
- Sales teams can focus on customers who are most likely to purchase.
- This makes sales efforts more effective and profitable.

(d) Automating Customer Support

- AWS Comprehend helps chatbots understand customer questions and provide helpful answers.
- It also sorts and prioritizes support tickets, making it easier for businesses to handle requests.

[3] FINRA – AI for Financial Regulation and Compliance**Overview**

FINRA (Financial Industry Regulatory Authority) is a self-regulatory organization that oversees U.S. financial markets. AWS Comprehend helps FINRA analyze financial documents, detect fraud, and ensure compliance.

How AWS Comprehend Helps FINRA**(a) Fraud Detection in Financial Reports**

- AWS Comprehend scans financial reports and identifies suspicious activities.
- It detects fraudulent patterns in investment reports, trading activities, and disclosures.
- This helps FINRA prevent financial crimes and protect investors.

(b) Compliance Monitoring

- AWS Comprehend analyzes regulatory filings and legal documents to ensure companies follow financial regulations.
- It helps detect non-compliant transactions and risky investments.
- This allows FINRA to flag potential violations before they escalate.

(c) Analyzing Customer Complaints and Reviews

- AWS Comprehend processes customer complaints and broker reviews to identify misconduct.
- It categorizes complaints based on sentiment and severity.
- This helps FINRA take quick action against unethical financial practices.

(d) Risk Assessment for Financial Institutions

- AWS Comprehend helps FINRA evaluate risk levels of brokerage firms and traders.
- It detects potential market manipulation or unusual trading patterns.
- This ensures a fair and transparent financial market.

References

[1] **Sprinklr – AWS Case Study**, AWS Documentation. Available at:
<https://aws.amazon.com/solutions/case-studies/sprinklr-resiliency-case-study/>

[3] **HubSpot – High Availability on AWS**, Bespin Global. Available at:
<https://www.hubspot.com/>

[5] **FINRA – AWS Case Study**, AWS Documentation. Available at:
<https://aws.amazon.com/solutions/case-studies/finra/>