

Project Proposal: Real-Time Crypto Market Trends & Sentiment Analysis

1. The Problem

The cryptocurrency market is highly volatile, influenced by investor sentiment, financial news, and macroeconomic trends. Unlike traditional stock markets, crypto markets operate 24/7, making it challenging for traders to track real-time price movements and sentiment changes. Traditional analysis relies on historical trends, but social sentiment often drives short-term price action before technical indicators react.

Social media platforms like Twitter and Reddit and financial news sources provide real-time insights into market sentiment, which can predict price fluctuations. However, existing tools lack a combined real-time approach to analyzing sentiment alongside market data. This project will use Azure services to build a real-time analytics pipeline that will provide traders with an early warning system for price swings.

2. Objectives & Expected Outcomes

Objectives:

1. Ingest and analyze real-time crypto price data alongside social sentiment from Twitter, Reddit, and news headlines.
2. Correlate sentiment trends with price fluctuations to identify market-moving events.
3. Create an interactive dashboard displaying live prices, sentiment analysis, and alerts.
4. Implement machine learning to detect sentiment anomalies and predict price swings.

Expected Outcomes:

- Real-time monitoring of crypto market trends.
- Live dashboard for price & sentiment correlation analysis.
- Alerts for market shifts based on sentiment spikes.
- A scalable Azure-based analytics pipeline.

3. Datasets & Alternatives

Primary Data Sources (Real-Time Streaming APIs)

1. Crypto Market Data (Prices, Volume, Trends)

- **CoinGecko API** (<https://www.coingecko.com/en/api>)
- Provides real-time price updates for thousands of cryptocurrencies.

2. Social Sentiment Data (News, Reddit, Twitter)

- **Twitter API v2** (<https://developer.twitter.com/en/docs/twitter-api>)
- **Reddit API** (<https://www.reddit.com/dev/api/>)
- **NewsAPI.org** (<https://newsapi.org/>)
- Captures investor sentiment in real-time from social discussions and news.

Historical Data for Benchmarking

- **Kaggle Crypto Price History Dataset**
(<https://www.kaggle.com/datasets/sudalairajkumar/cryptocurrencypricehistory>)
- Used to train sentiment-price correlation models.

4. Methodology

1. Data Ingestion

- **Azure Functions (Timer Trigger):**
 - Fetches **live crypto prices** from **CoinGecko** every **60 seconds**.
 - Retrieves **tweets, Reddit posts, and crypto news** every 5 minutes.
- Streams data to **Azure Event Hubs** for real-time processing.

2. Data Processing

- **Azure Stream Analytics** filters, cleans, and aggregates data.
- **Azure Cognitive Services (Text Analytics API)** performs sentiment analysis to classify posts as positive, neutral, or negative.
- **Azure Databricks** runs anomaly detection to detect unusual sentiment spikes and correlate with price trends.

3. Storage & Querying

- **Azure Cosmos DB** (Low-latency storage for real-time lookups).
- **Azure Data Lake Storage** (Historical data for long-term analysis).

4. Alerts & Notifications

- **Azure Logic Apps / Functions** send notifications if:
 - Sentiment shifts suddenly (e.g., 90% negative sentiment for Bitcoin).
 - Unusual price movements correlate with sentiment spikes.

5. Visualization

- **Power BI Dashboard** with:
 - Live price trends + sentiment heatmaps.
 - Historical sentiment vs. price movement analysis.
 - Real-time alerts for sentiment anomalies.

5. Conclusion

This project will merge real-time crypto price tracking with sentiment analysis, enabling traders to make data-driven decisions. Using Azure services, we will build a scalable, real-time pipeline for monitoring crypto market trends, offering an innovative solution for financial analytics.