Report for a Crypto Tracker Application

"BET-COIN.com"

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M00910300

BET-COIN.com

"BET-COIN.com" is a web-based application designed for tracking the 5 cryptocurrencies, namely Bitcoin(BTC), Ethereum(ETH), Litecoin(LTC), Solana(SOL) and Ripple(XRP). It tracks their prices in USD and displays them in a graph. It utilises machine learning algorithms to predict future increases/decreases in price and also provides a nice overview of the public sentiment around each individual coin.

This project utilises serverless cloud technologies like Lambda functions for the backend and seamlessly communicates with the clients using WebSocket APIs. All the data, i.e. rate, news, sentiment and connected client list, are stored in DynamoDB tables. The machine learning model is trained using Amazon SageMaker, and the training files and the static frontend files are stored in Amazon S3 buckets.

## Cloud storage of data from third-party web service

The crypto rates numerical data was downloaded from Alpha Vantage's API 'DIGITAL_CURRENCY_DAILY', and the text data for sentiment analysis was downloaded using NewsAPI. It was then stored in DynamoDB tables "CryptoRates" and "CryptoNews", respectively. All the code was written in Typescript and then transpiled to Javascript to run using NodeJS.

Machine Learning

The machine learning was carried out using AWS SageMaker's Deep AR models.
First, I downloaded the Synthetic data from Synthetic data link. Then I used Python to create the train and test files and uploaded them in an s3 bucket. I created the SyntheticDataModel following the tutorial with the default values and got the following result- Plotly Synthetic Data Results

Synthetic Data for Student M00910300
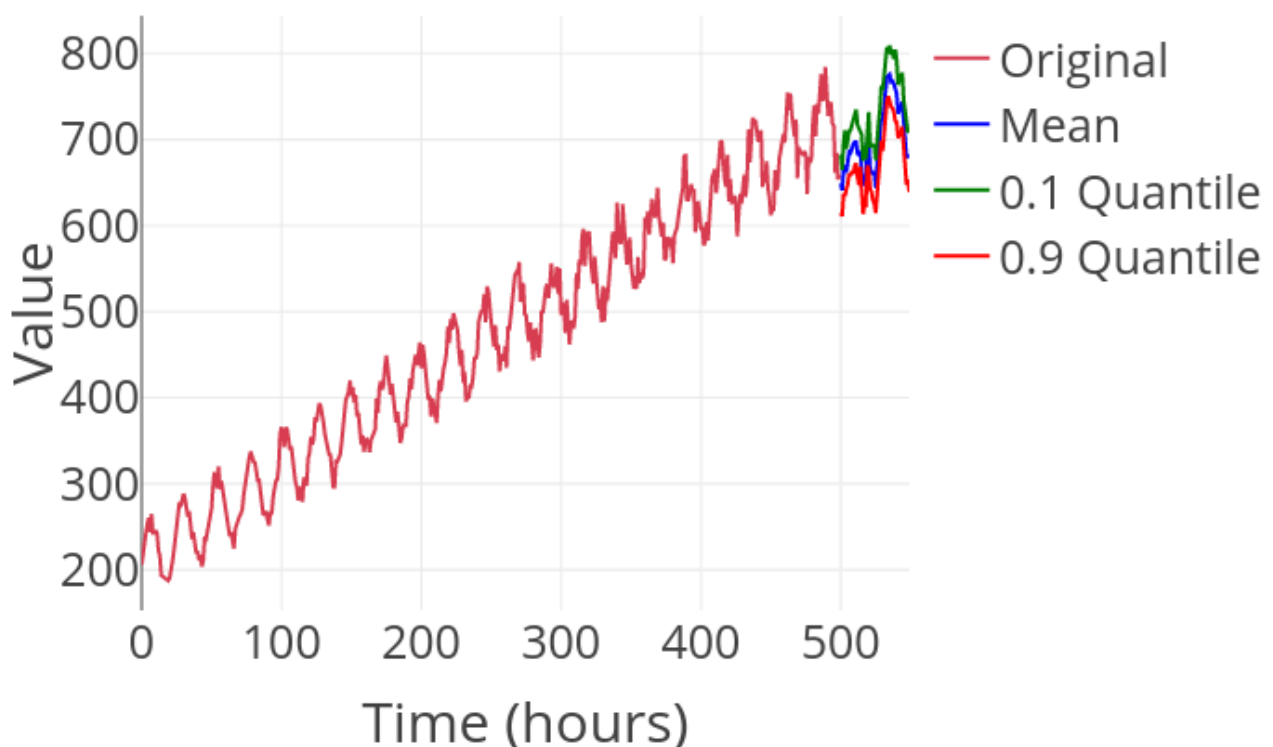
For the remaining models, I played around with different hyperparameters, like changing the number of epochs, the total number of neurons per layer and the total number of layers for the model. I also changed the likelihood to Gaussian from the default student-t as it gave better results and also tried a combination of learning rates from 0.01 to 0.001

You can use hyperparameters to finely control training. We've set default hyperparameters for the algorithm you've chosen. Learn more ⬈

Key	Value
mini_batch_size	128
time_freq	D
early_stopping_patience	
epochs	100
context_length	100
prediction_length	50
num_cells	80
num_layers	4
num_dynamic_feat	auto
dropout_rate	0.1
cardinality	auto
embedding_dimension	10
learning_rate	0.001
likelihood	gaussian ▼
test_quantiles	[0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9]
num_eval_samples	100

These modifications increased the training time from 7 mins to around 35 mins, but it gave a better result.

Amazon SageMaker 〉 Training jobs

Training jobs Info

🔍 Search training jobs

⟨ 1 ⟩

|	Name	Creation time	Duration	Job status	Warm pool status	Time left
○	XRPTrain1	3/26/2024, 4:30:08 PM	29 minutes	⊘ Completed	-	-
○	SOLTrain1	3/26/2024, 4:27:45 PM	37 minutes	⊘ Completed	-	-
○	LTCTrain1	3/26/2024, 4:25:38 PM	36 minutes	⊘ Completed	-	-
○	EthTrain1	3/26/2024, 4:20:53 PM	36 minutes	⊘ Completed	-	-
○	BitcoinTrain1	3/26/2024, 4:16:55 PM	36 minutes	⊘ Completed	-	-
○	SyntheticTrain1	3/17/2024, 11:34:52 PM	7 minutes	⊘ Completed	-	-

Sentiment analysis

I created a Lambda function to process the sentiment. It is triggered whenever a new element is added to the Crypto News table. It then proceeds to calculate the sentiment and stores it in another Crypto Sentiment table in DynamoDB.

	CryptoSymbol (String) ▽	CryptoTS (Number) ▽	Text ▽
☐	BTC	1712250037000	New Crypto 'Bitcoin Minetrix' Nears $13 Million Raised in Token Presale – What Is BTCM…
☐	BTC	1712243502000	SEC opens comment period for Ethereum spot ETF proposals
☐	BTC	1712231253000	Robert Kiyosaki, David Einhorn, and Gary Shilling are all worried about inflation — and s…
☐	BTC	1712155992000	Goldman Sachs executive remains skeptical about Bitcoin
☐	BTC	1712153146000	U.S. Government moves $2 billion in seized Bitcoin from Silk Road
☐	BTC	1712103000000	Bitcoin Tumbles $5,000 In 24 Hours As Interest Rates Jump
☐	BTC	1712070677000	Bitcoin is bleeding. Why it's dropped below $65,000
☐	BTC	1712068668000	Solana Crypto Presale 'Slothana' Raises $6 Million – SLOTH Meme Coin Review
☐	BTC	1712063726000	Is MEV Possible on Bitcoin?
☐	BTC	1711995540000	Bitcoin ETFs are soaring, but one is struggling. Blame high fees

	CryptoSymbol (String) ▽	CryptoTS (Number) ▽	Sentiment ▽
☐	BTC	1712250037000	0
☐	BTC	1712243502000	0
☐	BTC	1712231253000	-0.16666666666666666
☐	BTC	1712155992000	-0.2857142857142857
☐	BTC	1712153146000	0
☐	BTC	1712103000000	0.1
☐	BTC	1712070677000	-0.125
☐	BTC	1712068668000	0
☐	BTC	1712063726000	0
☐	BTC	1711995540000	-0.18181818181818182

Architecture

Enhanced Web Application Architecture
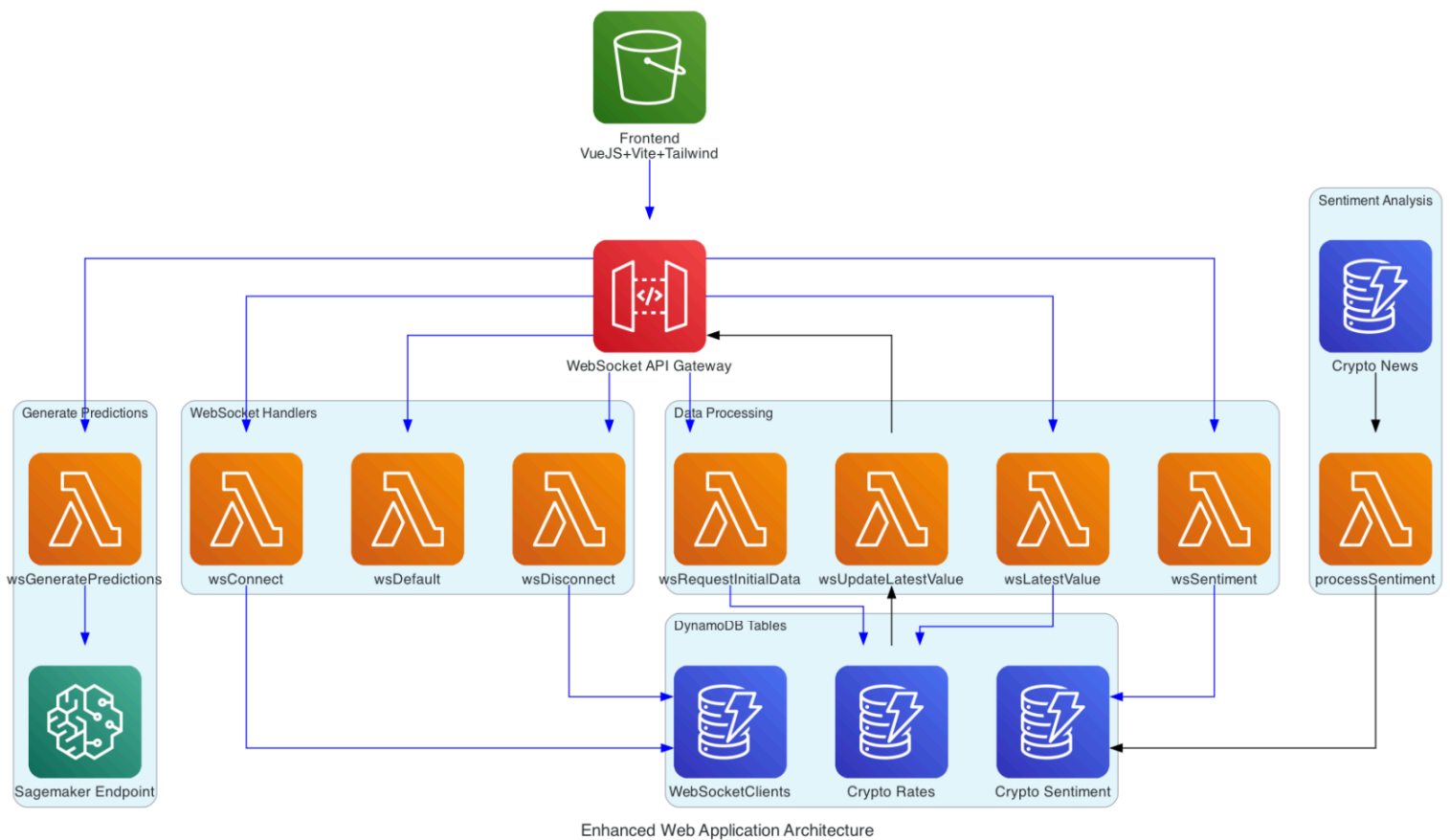
In the architecture diagram above, the blue arrows represent bidirectional data transfer, and the black arrows represent uni-directional data transfer. The API Gateways connects the client with all the microservices.

Serverless

The backend runs completely using Lambda functions. They are triggered when there is a new WebSocket API request or when the DynamoDB table updates to give the latest information to the client.
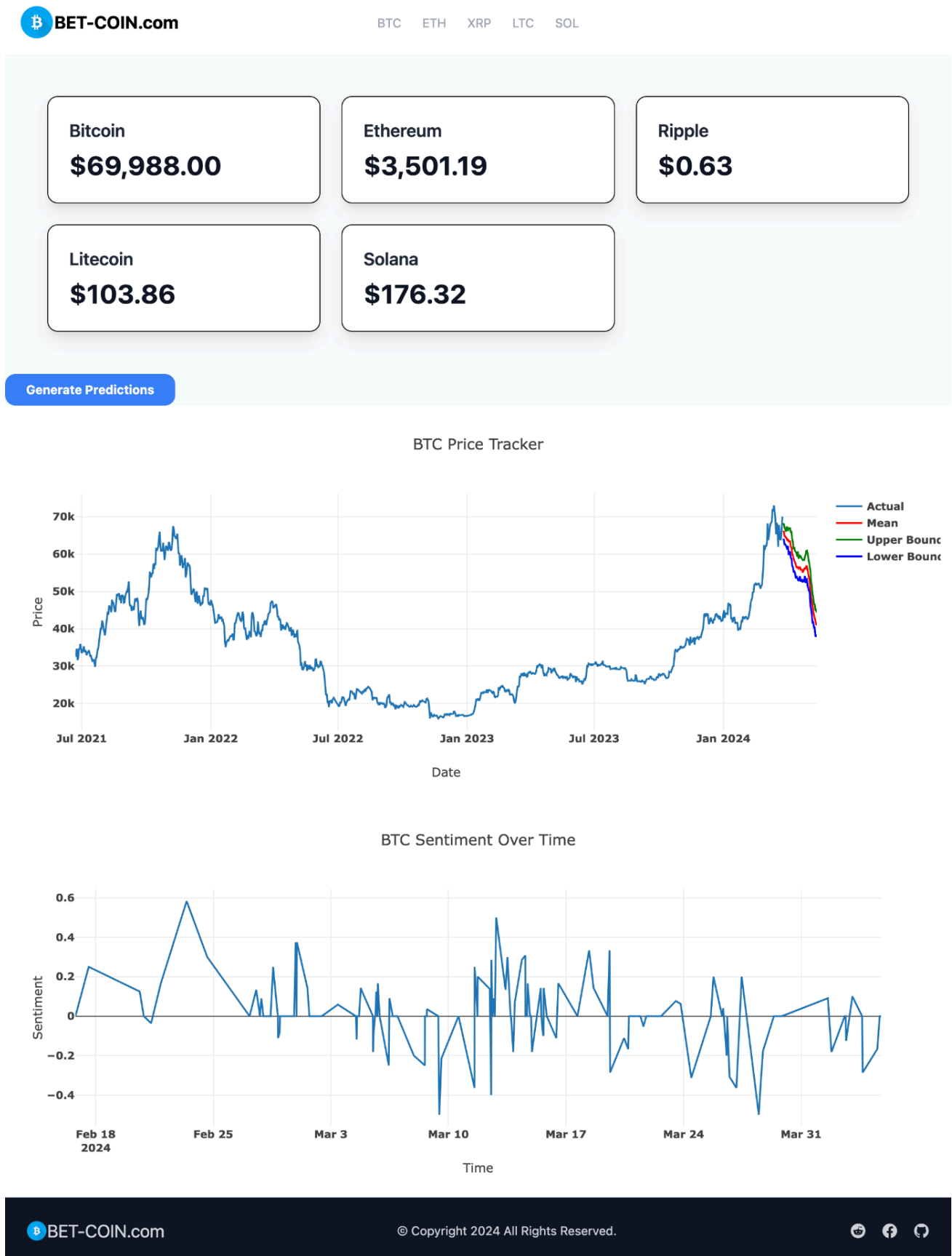I have 2 types of event processing
- To process sentiment when new data is added to the Crypto News table.
- To broadcast the latest Crypto Prices to all connected clients when the Crypto Rates table is updated.
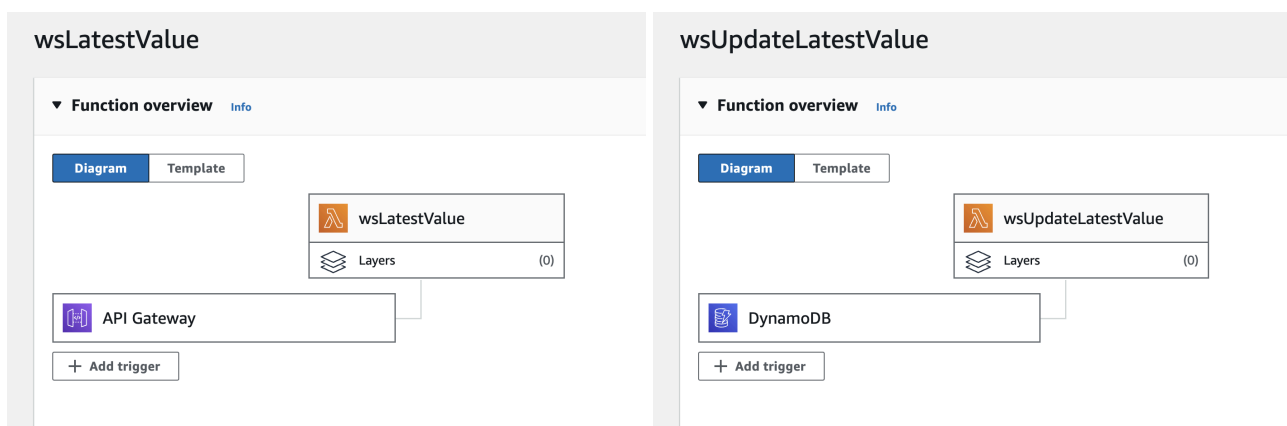
Screenshots

The front end is hosted on Amazon S3 and can be accessed here: [BetCoinDotCom](#)

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BTC   ETH   XRP   LTC   SOL

Bitcoin
$69,988.00

Ethereum
$3,501.19

Ripple
$0.63

Litecoin
$103.86

Solana
$176.32

Generate Predictions

ETH Price Tracker

ETH Sentiment Over Time
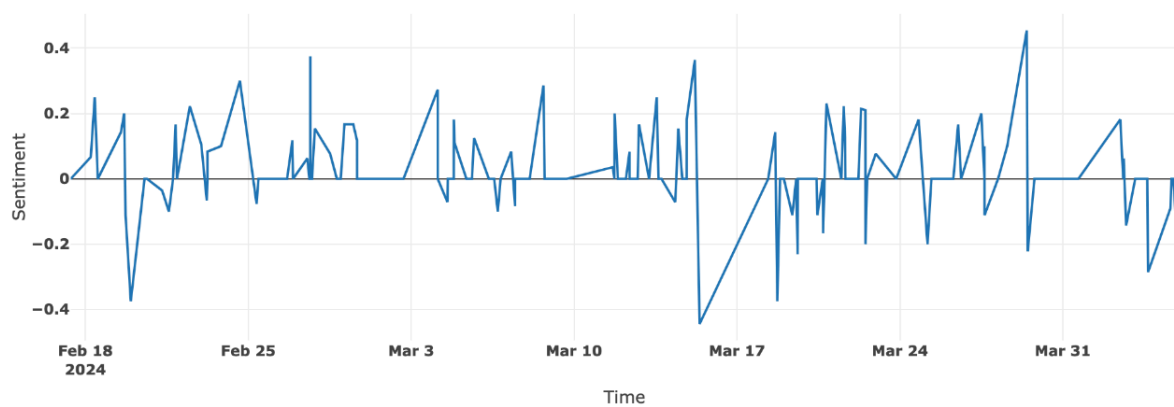
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Bitcoin
$69,988.00

Ethereum
$3,501.19

Ripple
$0.63

Litecoin
$103.86

Solana
$176.32

Generate Predictions

XRP Price Tracker

XRP Sentiment Over Time
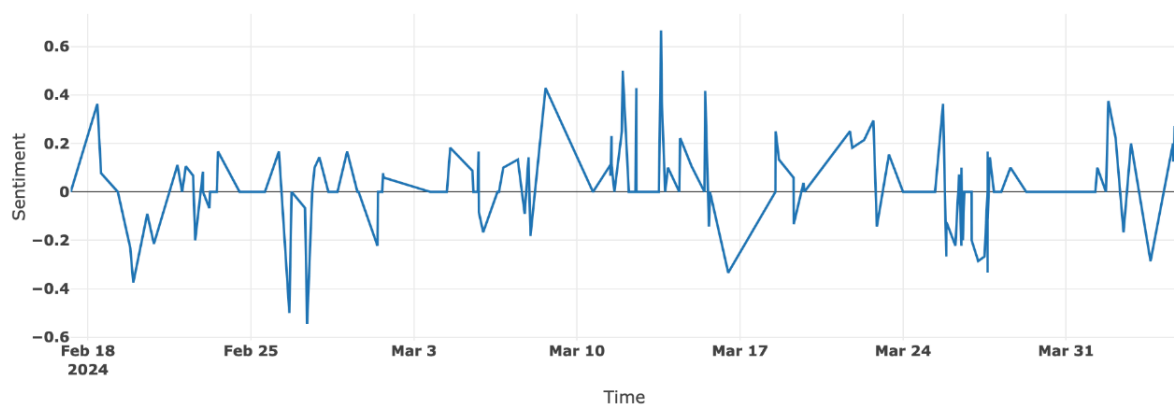
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BTC   ETH   XRP   LTC   SOL

Bitcoin	Ethereum	Ripple
$69,988.00	**$3,501.19**	**$0.63**

Litecoin	Solana
$103.86	**$176.32**

Generate Predictions

LTC Price Tracker

— Actual
— Mean
— Upper Bound
— Lower Bound

Price

Jul 2021   Jan 2022   Jul 2022   Jan 2023   Jul 2023   Jan 2024

Date

LTC Sentiment Over Time
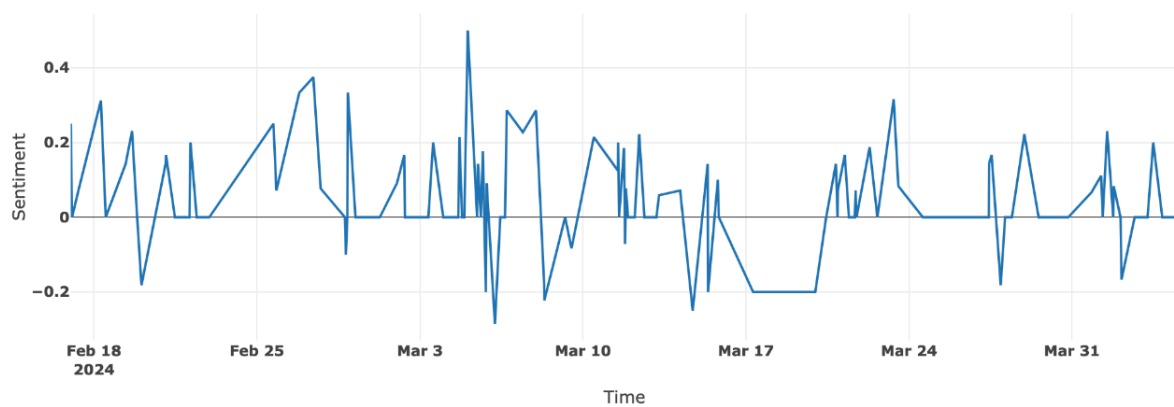
Sentiment

Feb 18 2024   Feb 25   Mar 3   Mar 10   Mar 17   Mar 24   Mar 31

Time

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Bitcoin	Ethereum	Ripple
$69,988.00	**$3,501.19**	**$0.63**

Litecoin	Solana
$103.86	**$176.32**

Generate Predictions

SOL Price Tracker

— Actual
— Mean
— Upper Bound
— Lower Bound

SOL Sentiment Over Time