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A Novel approach to time series forecasting using liquid time-constant networks

Agenda

I Problem Background & Domain

II Research Gap & Existing Solutions

III Algorithm Design

IV Proposed Architecture

V Prototype Demo

VI Progress & Required Improvements

Problem Background

Time Series Forecasting

- TS forecasting is a significant business issue and an area where ML could create an impact.
- Although ML and DL have outperformed classical approaches for NLP and computer vision, the domain of TS still seems to be a struggle compared to classical statistical methodologies.

Existing TS forecasting systems cannot adapt to incoming data streams with unexpected changes and characteristics that are different from the data on which they were trained.

Problem Domain

Cryptocurrencies

- The word ‘crypto’ has been an enormous buzzword recently, especially BTC. It has even come to the point where crypto and BTC are used interchangeably.
- Its a fully decentralized means of exchange/digital currency.

However, being at the forefront of the digital currency world, it has developed high volatility, making it difficult to predict future rates.

Research Gap & Existing Work

Time series forecasting algorithms

- Existing forecasting solutions are all implemented using traditional deep neural net architectures (ex: LSTM, RNNs, GRU, etc.)

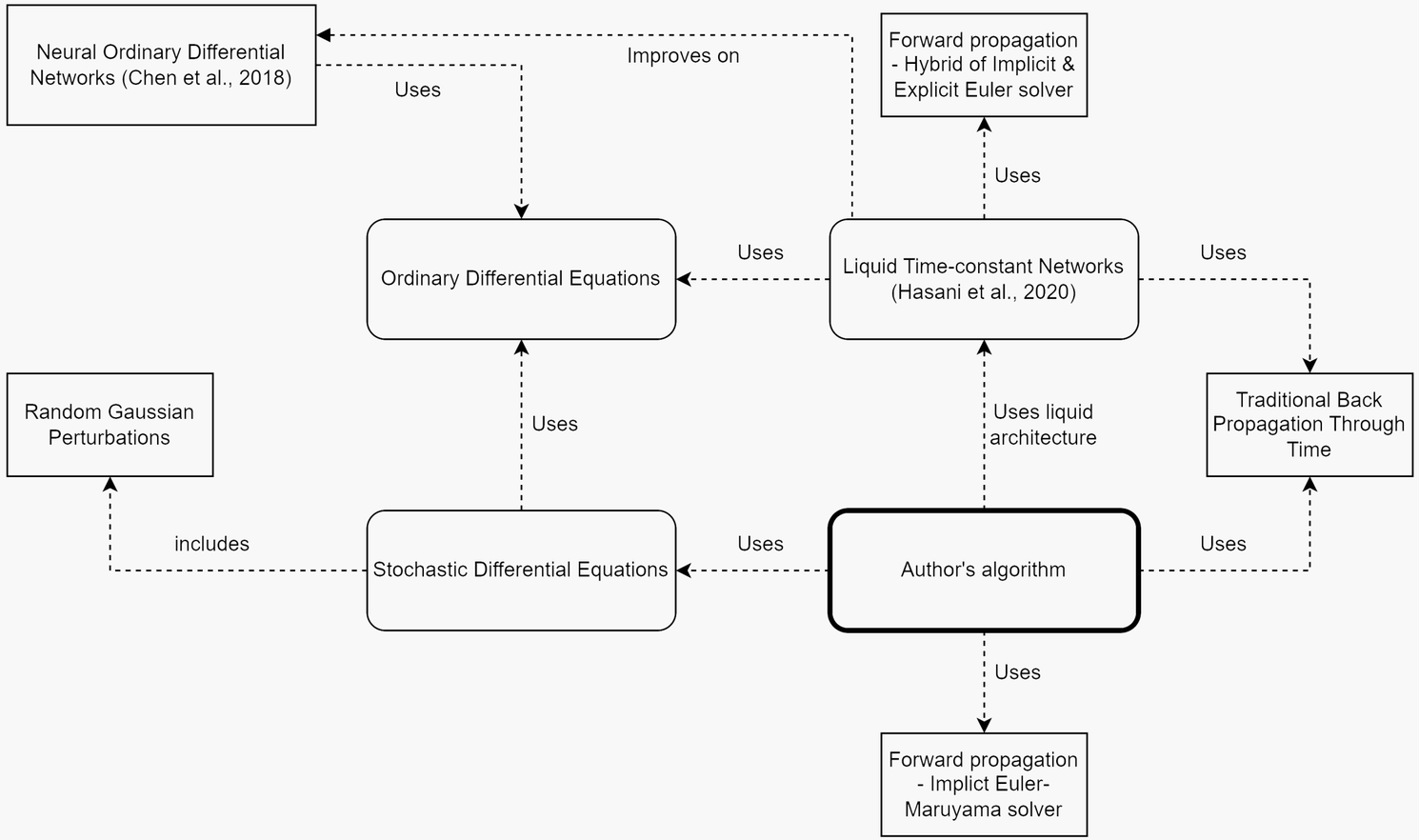
Existing work

- Liquid Time-Constant networks, a member of the neural ordinary differential equation family, solved this to some extent.

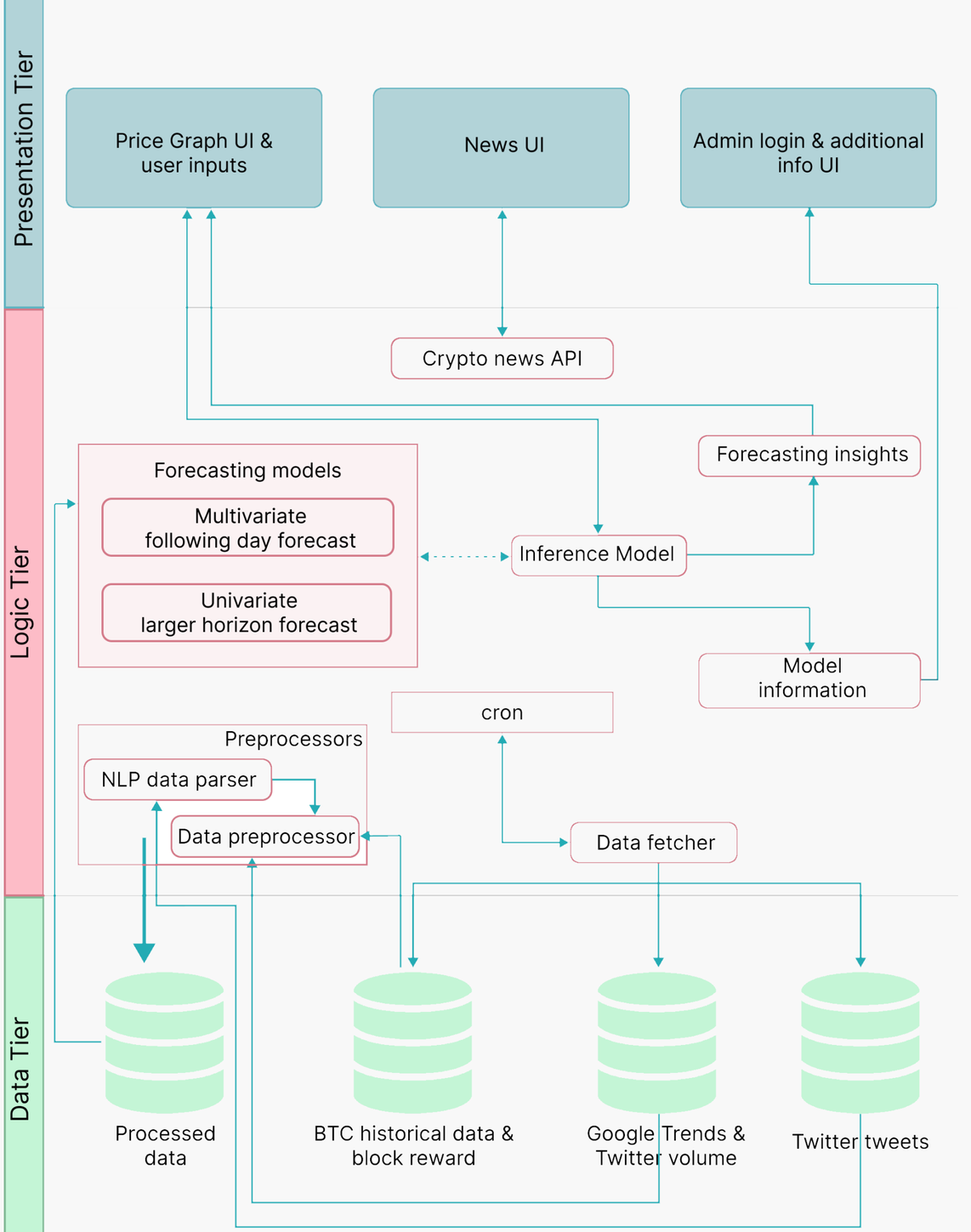
There's a limitation here: areas with greater randomness - instantaneous, miniscule changes cannot be modelled.

Solution & Algorithm Design

Stochastic differential equations can be used instead of ordinary differential equations!



Proposed Architecture



Prototype Demo

Progress & Required Improvements

Progress

- Core research component is implemented.
- Model integrates with required data sources.
- UI is created, however, integration is pending.

Required improvements

- Attempt to further enhance performance.
- API integration with UI.
- Comparison with any existing solutions.

Desirable improvements (if time permits)

- Integrate Explainability to provide reasoning about the inference.
- Create and evaluate other neural ordinary differential equations.