POPL

PROJECT

GROUP 26: FINANCIAL FORECASTING USING BAYESIAN ALGORITHMS IN PYRO

CONTENT

PROBLEM STATEMENT

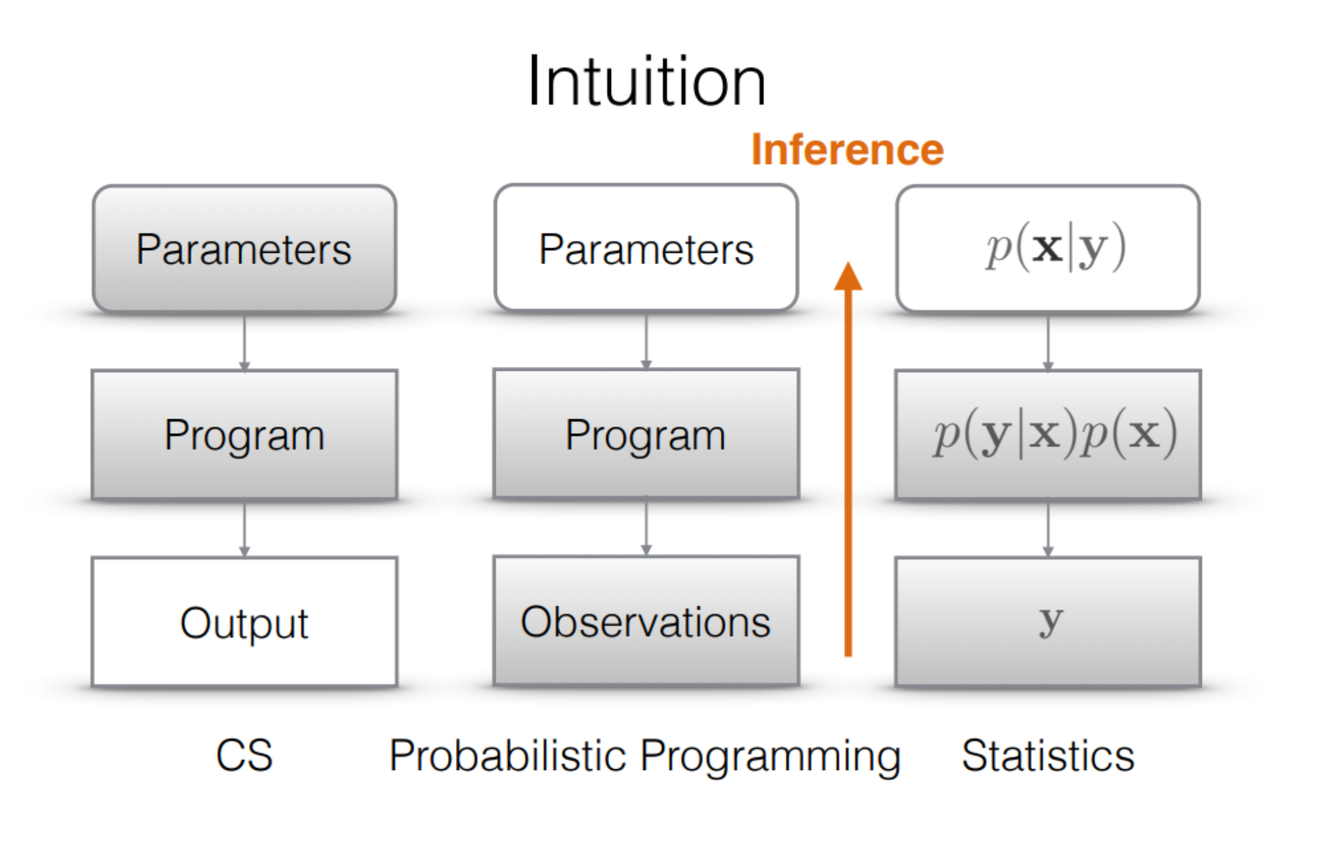
Mission

- Financial forecasting using probabilistic programming with Pyro, investigating its reliability, accuracy, and uncertainty estimation capabilities even while working with limited datasets.
- We have specifically chosen cryptocurrencies as our dataset due to their volatile nature.

Aim

- Achieve better regularization
- Reduce data needs
- Provide more accurate predictions
- Enhance reliability

WHY PYRO ?



Typical programming pipeline:

- Write a program
- Specify the values of its arguments or situate it in an evaluation environment
- Evaluate the program to produce an output

Probabilistic programming pipeline:

- Start with the output/data (Y)
- Use algebra and inference to characterize the posterior distribution p(X|Y) of the unknown quantities in the model given the observed quantities.

WHY PYRO ?

Probabilistic

Pyro allows us to express our model as a probabilistic program, which is a powerful way to capture uncertainty and model financial data.

Data Efficiency

Pyro can work with smaller datasets when compared to traditional Python, reducing computational costs and training time.

Accuracy

Using weight regularization, we can drastically reduce the risk of overfitting and thereby improving the accuracy of the prediction.

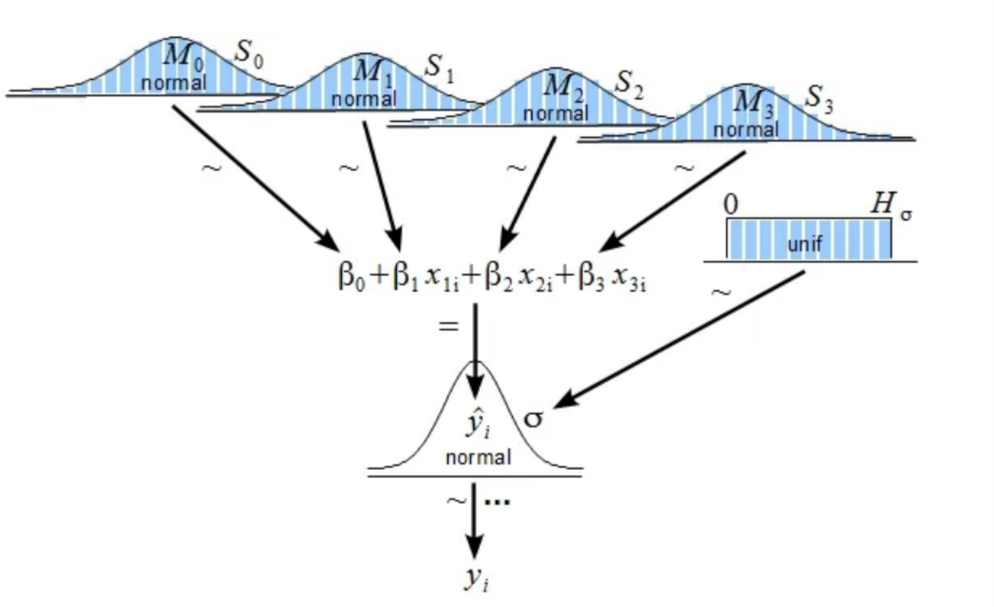
WHY BAYESIAN ?

Objective 1

Bayesian methods gave us the opportunity to regularize neural nets without adding a regularizer manually

Objective 2

Instead of sequential updating static weights we were updating distribution of weights



Objective 3

Bayesian algorithms learn on the go

Bayesian inference: Computing the conditional distribution of program inputs that could have given rise to the observed program output.

WHAT NEXT ?

Data input

Historical prices
Trade volume

MILESTONE 1

Data input

Historical prices
Trade volume
Tweet volume

MILESTONE 2

Discrete deterministic inferences using Python

COMPARISON

TEAM MEMBERS

01 DIVYE GOEL (2021A7PS2908G)

02 ANAY MUNDRA (2021A7PS2837G)

03 SHRAVAN GARG (2021A7PS2731G)

04 AVANI AGARWAL (2021A7PS2585G)