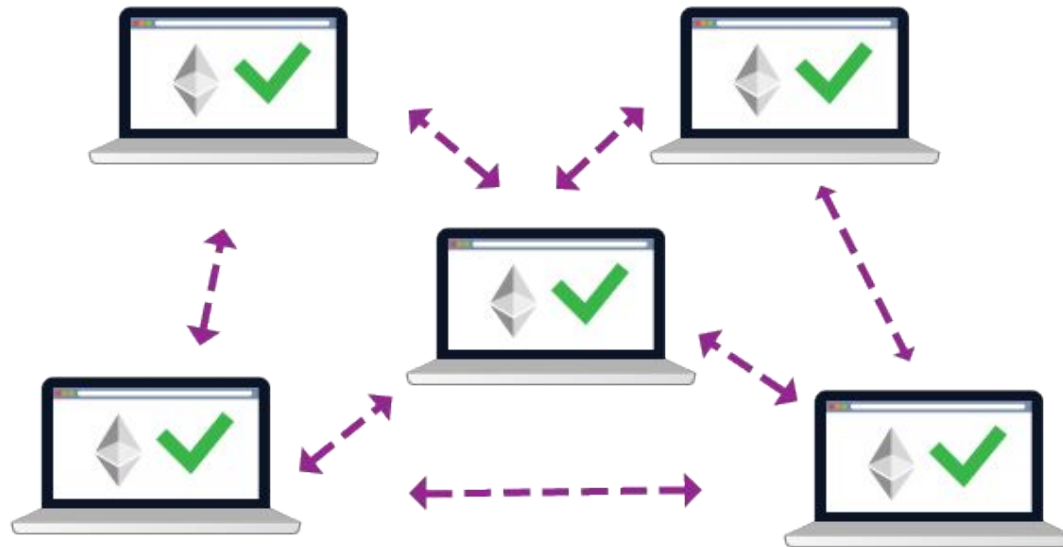


Estimating Ethereum Gas Prices

Brandon Butler

DSI Capstone October 2017

Blockchain technology



Ethereum gas

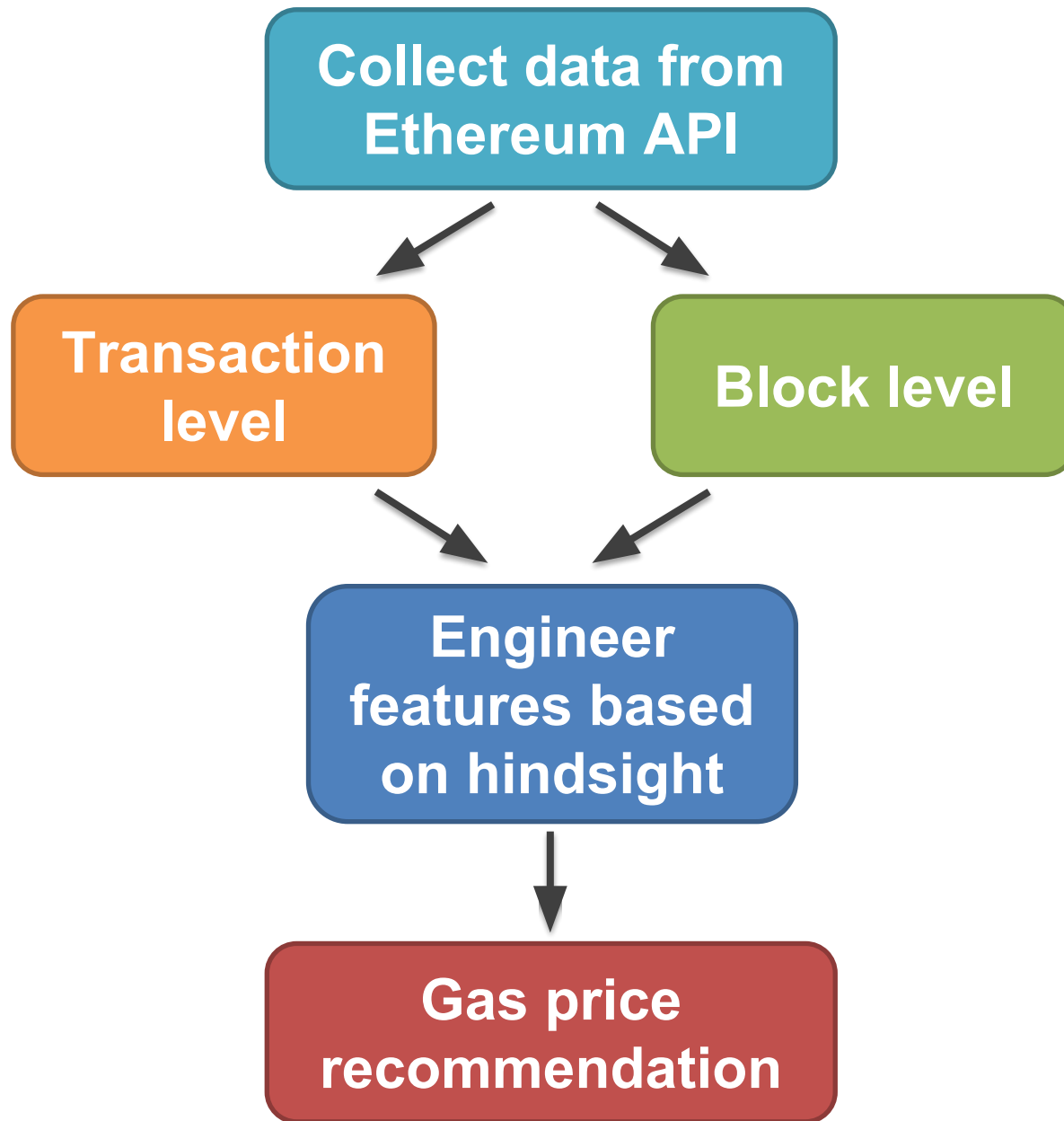
Computational effort required to process transaction

Gas price:

A set price to pay per unit of gas spent

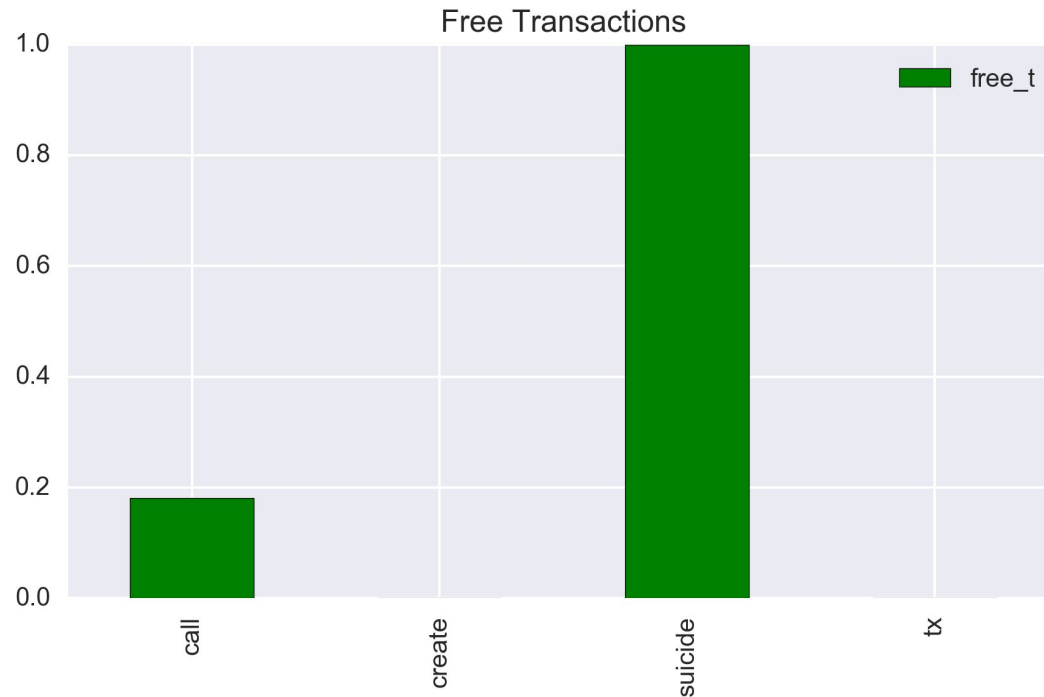
$$\textit{Total Fee} = \textit{Gas Price} \times \textit{Gas Used}$$

- Set gas price too low → Transaction fails
- Set gas price too high → Overpaid



Transactions

- Monetary transfers: tx
- Smart contracts: calls, create, suicide



Free transactions

- All suicides are free
- Calls are free ~20% of the time
- Create/tx always use gas

Label design

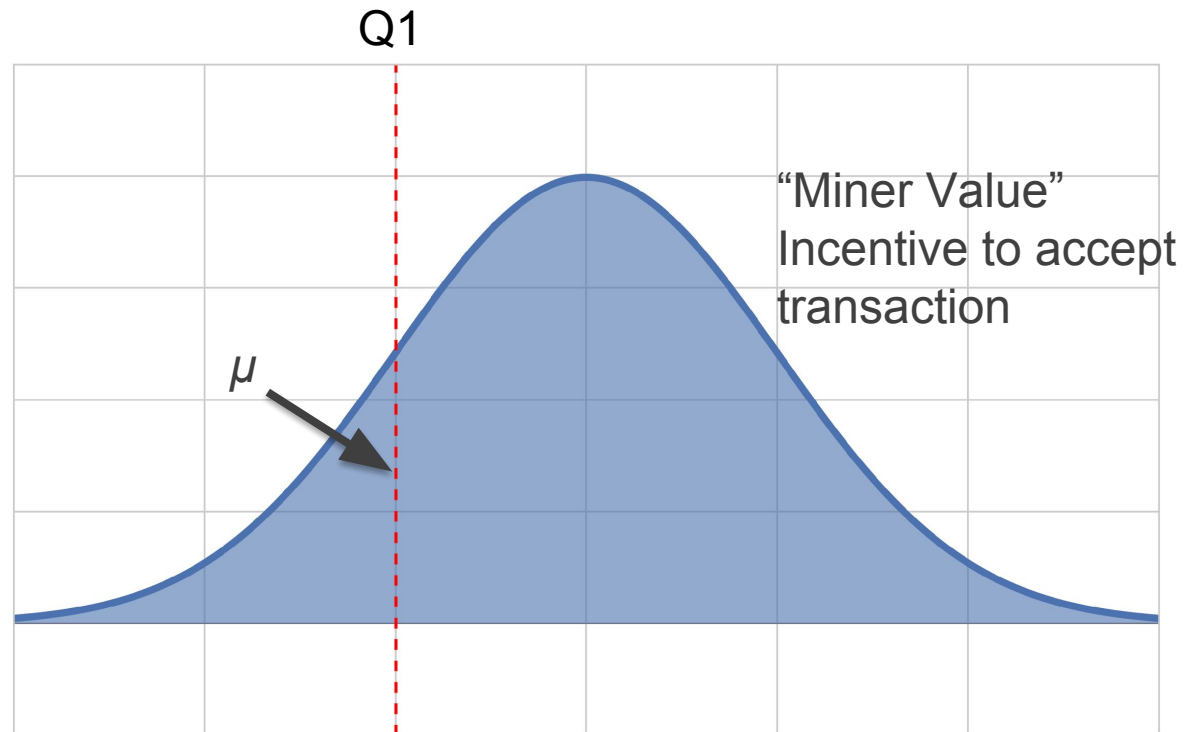
Estimated price with hindsight

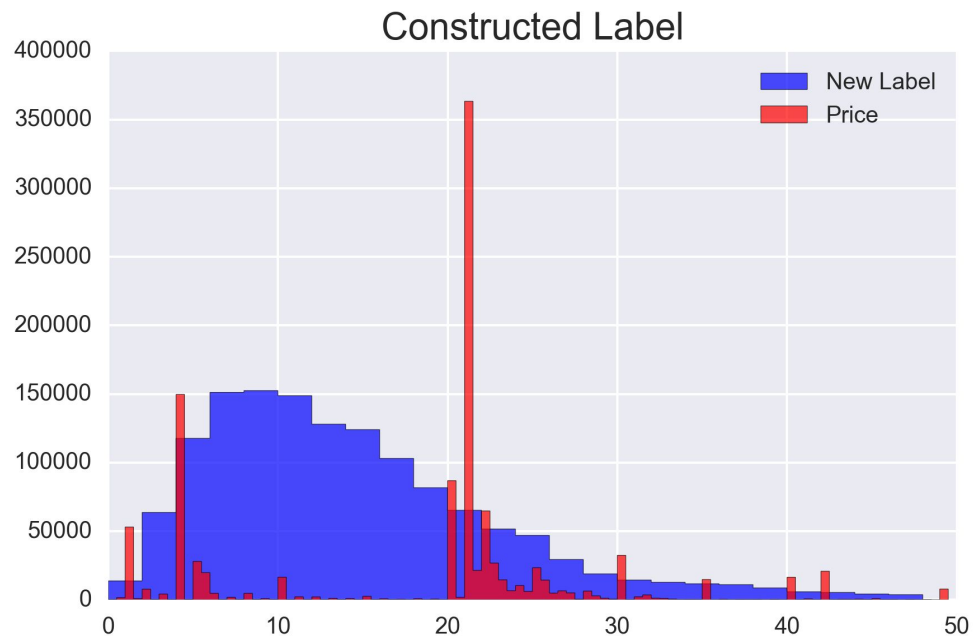
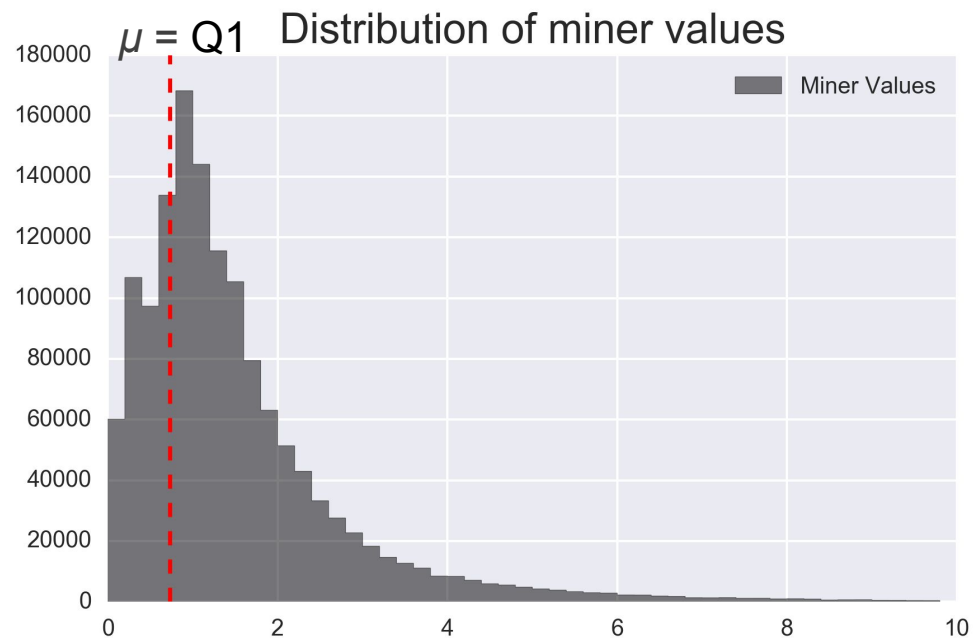
Given information about previous blocks in time, what is our estimate of what the price should be

Upon finding μ

Construct a mathematical model for our new label, L

$$L = \mu \frac{P_{GB}}{G_{UB} + G_{UT}(1 - \mu)}$$





Feature engineering

Hindsight features:

Averaged values over two time horizons

- 6 previous blocks (~ 1min): current state
- 60 previous blocks (~10min): long-term view

6 block window

Block time
Price
Gas used
Tx count
Difficulty

60 block window

Block time
Price
Gas used
Tx count
Difficulty

Modeling

Linear regression

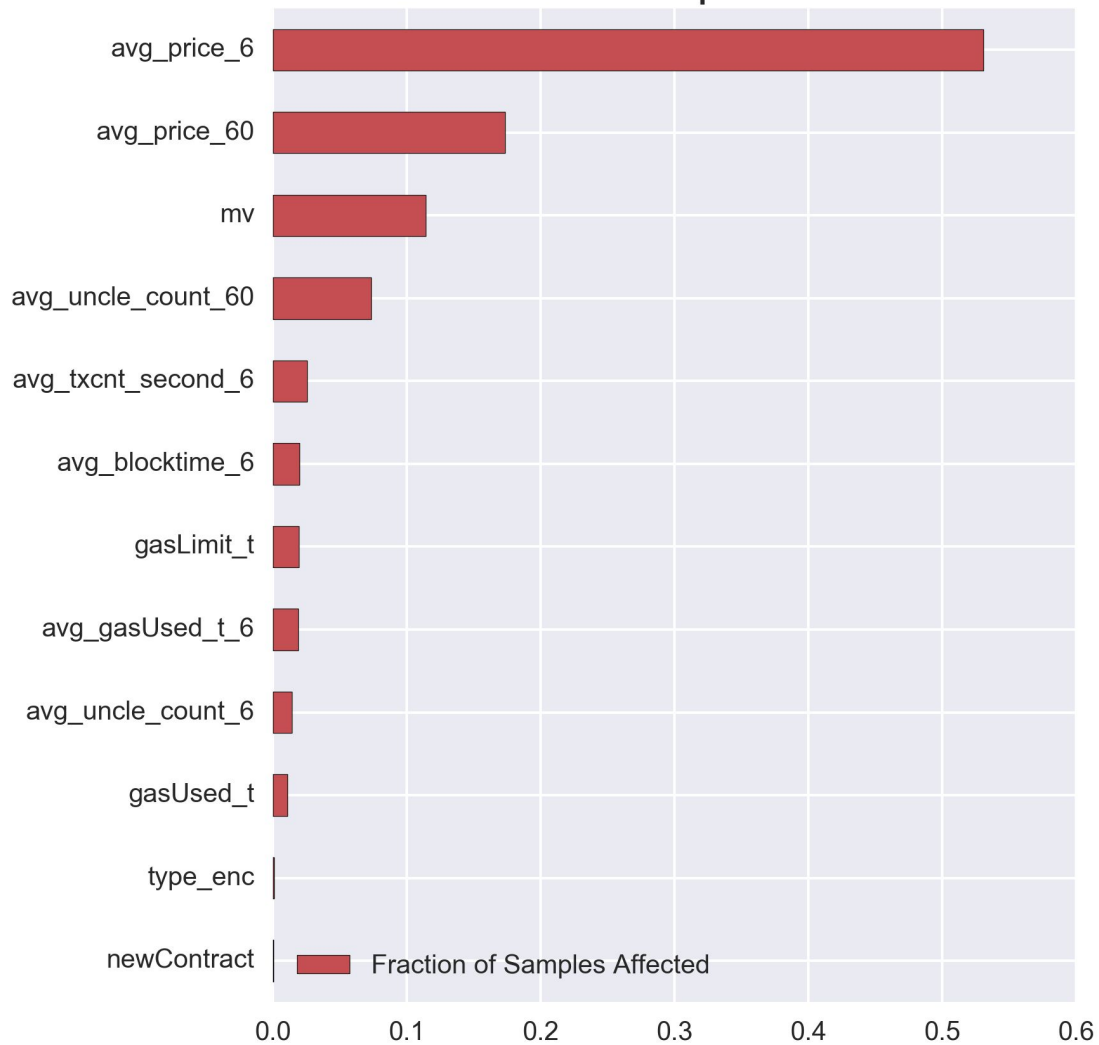
Decision trees

Boosting

Random forest

- Feature pruning
- Model tuning
- Optimized with grid searching / cross validation
- Model validation

Feature Importance



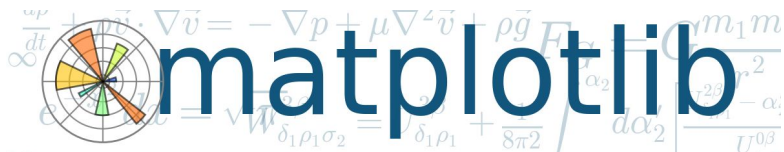
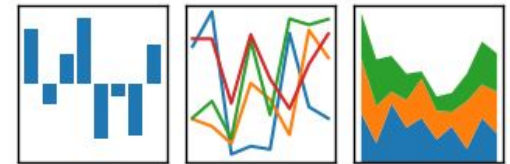
Future

- Utilize entire ethereum blockchain data while also taking in real-time data as it comes in
- Employ neural network model
- Provide real-time gas recommendations



pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



Thank you

Acknowledgements

Sweetbridge

- Hui Huang
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