

Predicting Bitcoin: Time Stamped Results

Summary

TradeBot is software that predicts near term change in the price of cryptocurrencies. Using an ensemble of regressions, TradeBot can accurately issue a “buy” or “sell” command and consistently make profit. Since February 11, TradeBot has time stamped its predictions for 32 different strategy variants, which (as of time of writing, July 1) made an average return of 130%.

Methods and Verification

The predictions are numbers which usually range between 0 and 1, where greater than 1 means “buy” and less than 0 means “sell”. To verify the data in this memo independently, you need only to iterate through a given strategy’s predictions, record the buy and sell prices, and apply a 1% penalty for each transaction. This penalty is to account for illiquidity and actual transaction fees.

The time stamped files, as well as code to access and use them, are available here: <https://drive.google.com/open?id=1Za5vwnU8zh9fgq1U9XtTzeZiWVaKjzR>.

Strategy Variants

The strategy variants derive from different ways of pooling raw output. From our cohort of regressions, we partition 4 different time frames: short term, medium term, long term, and “full set”, which includes every regression. These time frames refer to the length of the period a given regression was trained on.

We also have 4 different prediction types: the raw prediction from the regression, a ‘normal’ prediction whereby the raw is adjusted to expected buy or sell thresholds, a ‘raw optimized’ prediction where we correct previous bias on a per regression basis for the raw prediction, and a ‘normal optimized’ prediction where we do the same for the normal. Note that these all come from the same value at any given moment, but the point at which they buy or sell may differ.

Lastly, we pool the predictions via either median or average. Hence, $4*4*2 = 32$ variants.

The following chart shows the performance of each strategy; values show a wallet which started at 100. For context, a wallet which bought and held Bitcoin since the beginning of our data set would have a value of 302.

Performance By Time Frame and Prediction Type

Metric	Raw	Normal	Raw Optimized	Normal Optimized	Average
Short Term Average	211.6	193.36	217.79	292.06	228.7
Short Term Median	213.51	139.8	217.79	292.06	215.79
Medium Term Average	216.52	209.43	277.68	240.54	236.04
Medium Term Median	178.65	205.84	298.37	182.81	216.42
Long Term Average	171.93	250.62	232.83	241.23	224.15
Long Term Median	205.7	217.6	223	215.37	215.42
Full Set Average	213.86	246.34	277.44	283.05	255.17
Full Set Median	230.8	250.48	258.73	275.41	253.86
Total Average	205.32	214.18	250.45	252.82	230.69

A clear trend here is the significant outperformance of the Raw Optimized and Normal Optimized metrics versus their non-optimized counterparts. There is not an immediately obvious trend in average time frame performance.

Overall, the results are positive: we have made a significant average profit in a short period of time. However, we have lagged Bitcoin's parabolic advance. To see why, and to give a sense of how the variants actually trade, let's look at an individual trade history that's close to the average performance, in this case the Raw Optimized Long Term Average:

Trade	Price	Date
Buy	\$4919	4/4
Sell	\$11127	6/22
Buy	\$10687	6/23
Sell	\$13383	6/26
Buy	\$12737	6/27

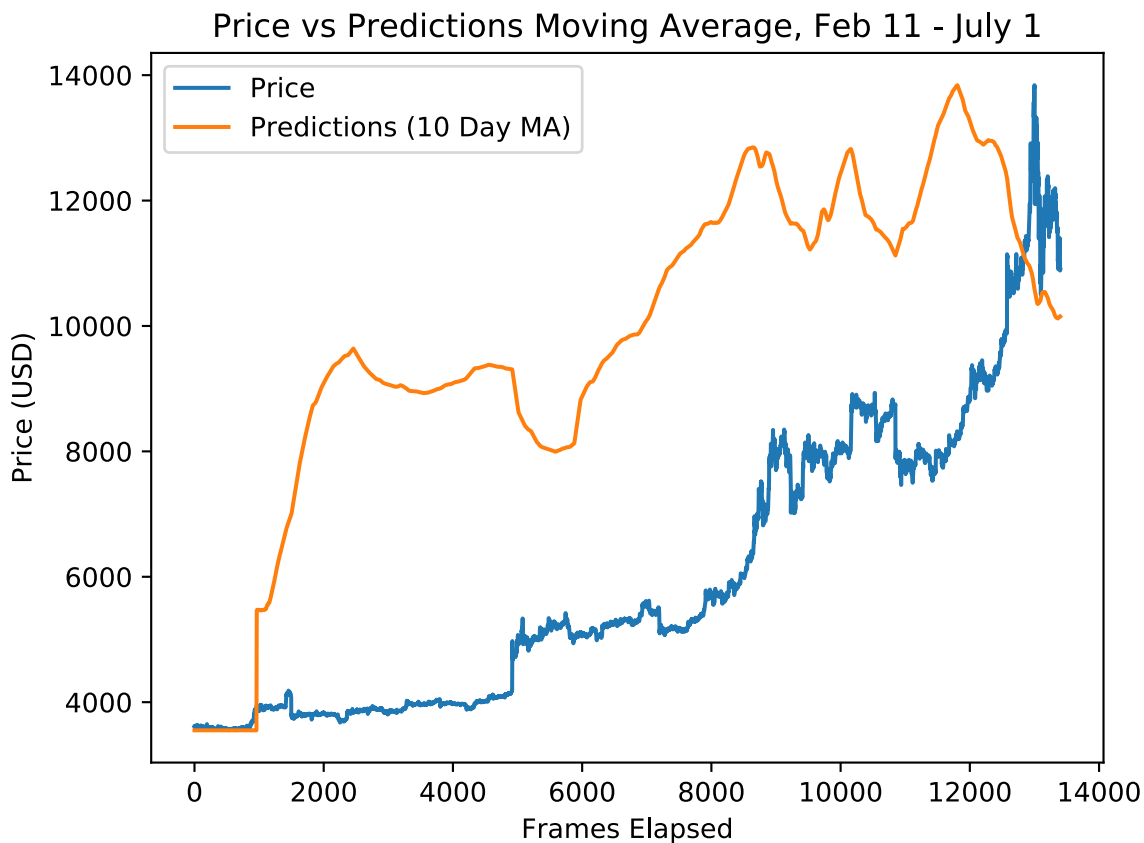
This variant performed well in catching a major move from 4900 to 11000, and again from 10700 to 13400; but it missed the move from 3800 to 4900, which

many of its peers caught, and almost certainly bought in again too early after the peak, which has negated some of its success (a 14% drawdown so far).

Nevertheless, it's a good example of how the TradeBot system can produce patience and long term holds, and also fast, responsive trading, while maintaining a certain level of profitability.

Prediction Moving Average—Drawing the Price Curve

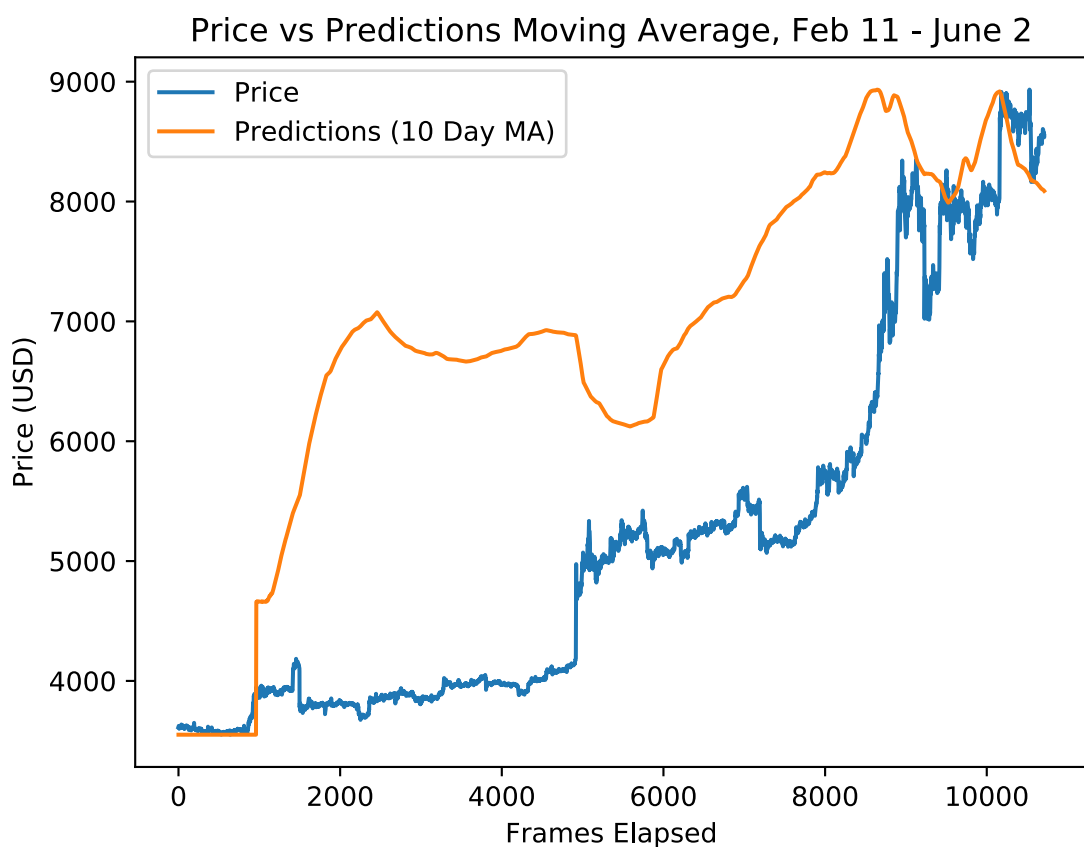
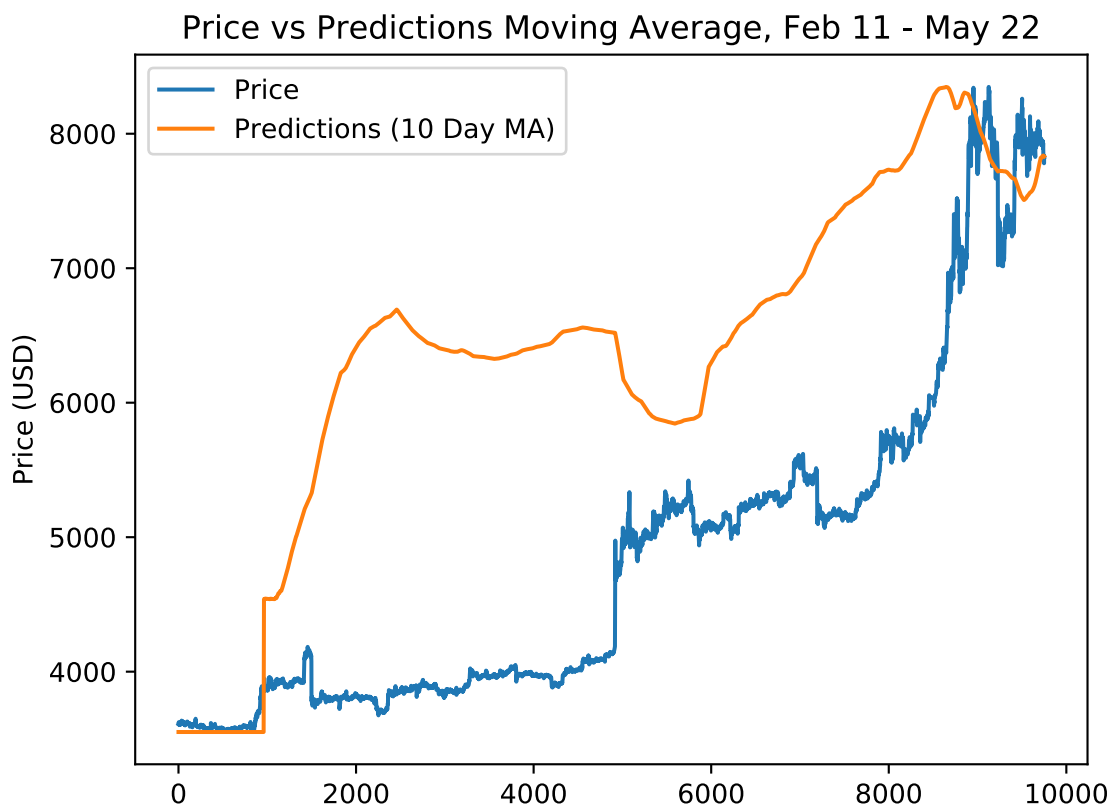
A more visually striking way to assess TradeBot's performance is to look at the moving average for some of our strategies. Below is the 10 day moving average for the full set of Raw predictions, with predictions normalized to price:

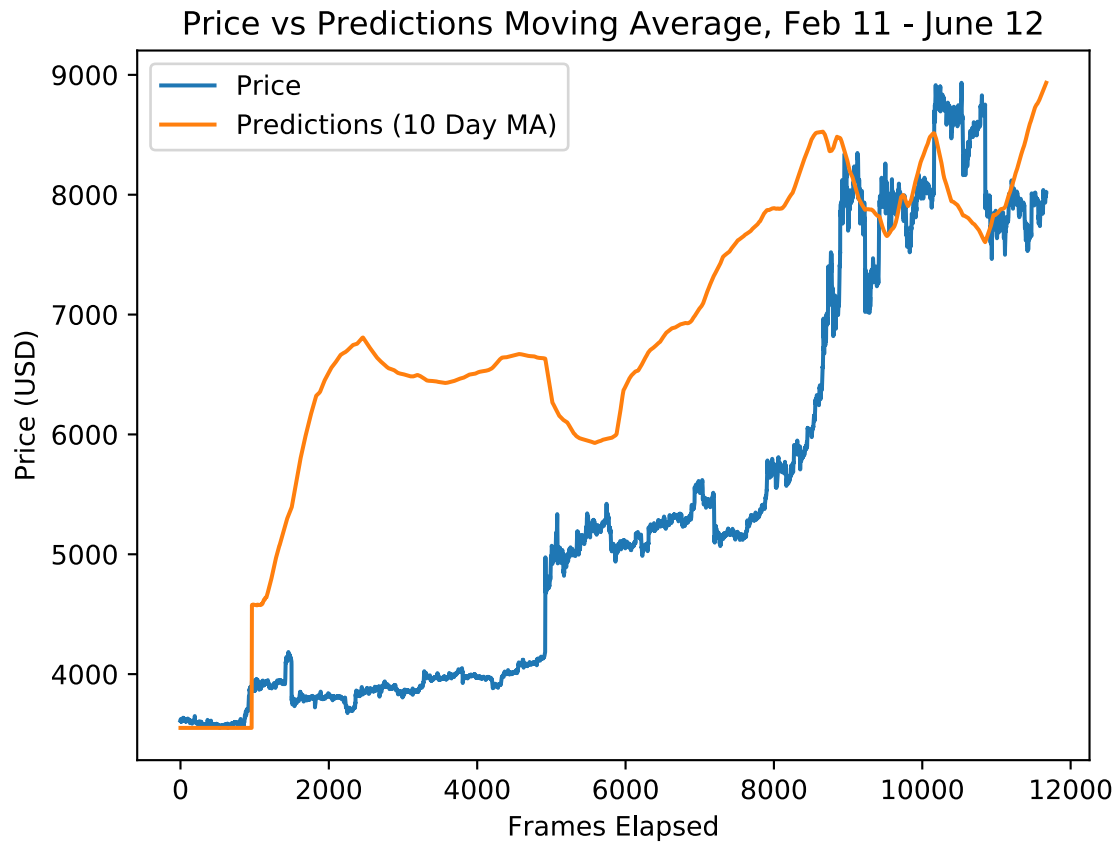


What we're looking for here as an indication of success is whether the direction of the moving average anticipates changes in the direction of price; signs point to yes.

The moving average peaks shortly before the first peak of the price, and begins rising before the second peak; it makes new highs before Bitcoin's price does the same and hits 13,800. It's interesting—though not in any way conclusive—that price appears to have bounced around where the MA stopped its decline.

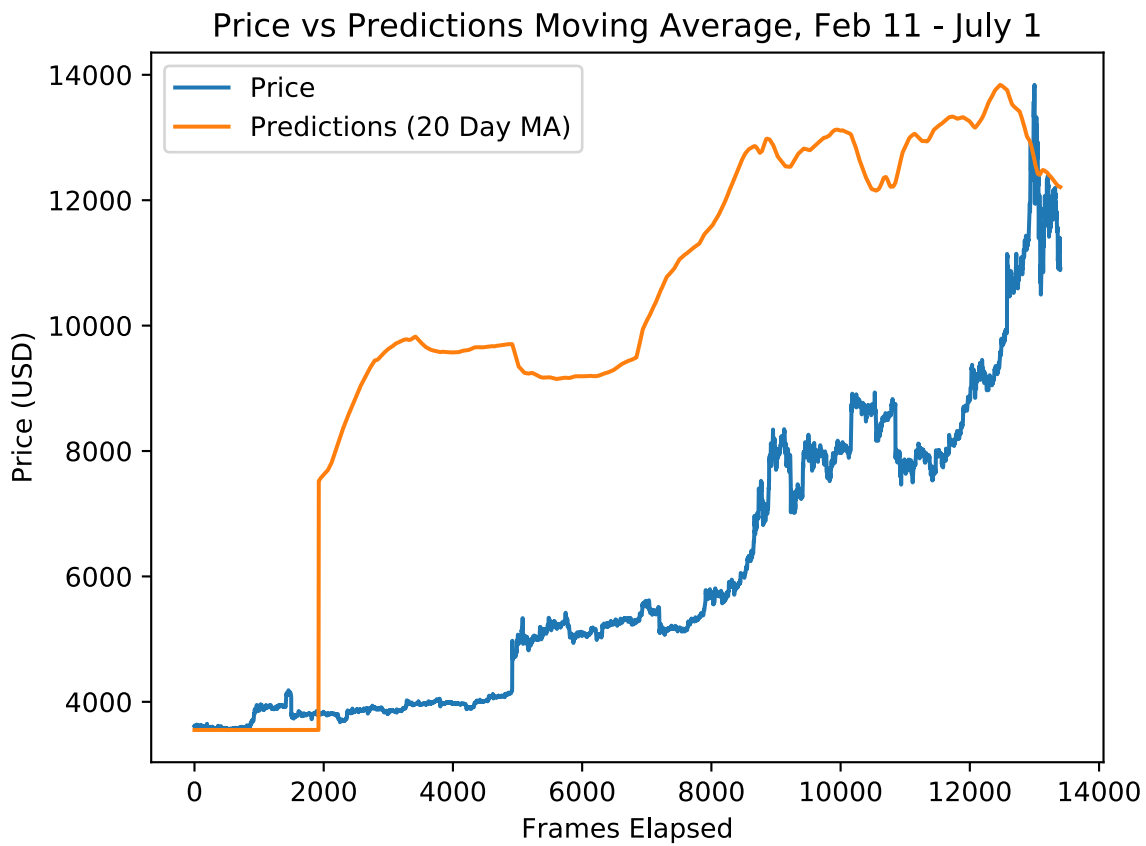
Because we normalize the predictions to price, the graph can become distorted over time. Prior versions are illuminating:



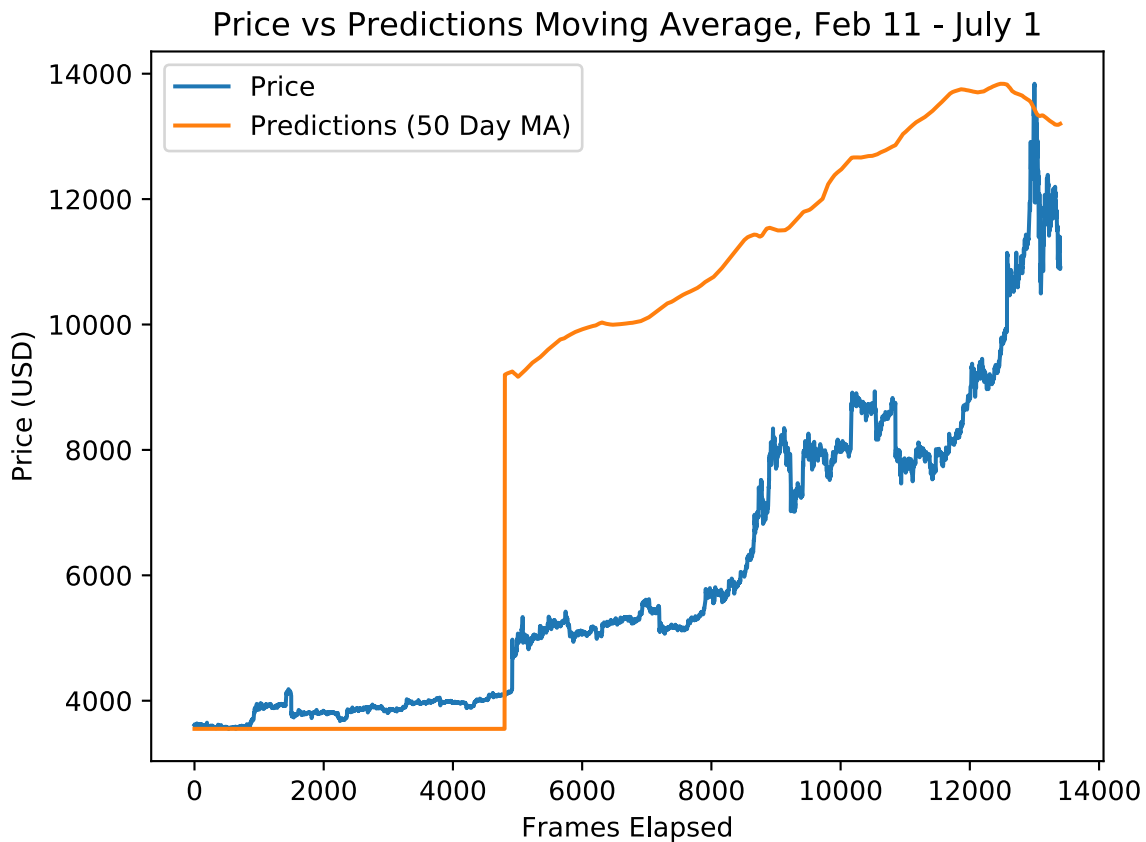


These make more obvious the relationship between peaks and troughs in MA and price, simply because we visualize them as closer together. To view a frame by frame progression, use the “animate_ma” command in run_commands.py.

Longer moving averages, though less descriptive, might be a superior way to indicate larger trends. The following shows the 20 day MA:



The normalized levels for the 20 day don't correspond as closely with the levels for price, but it does a good job in describing the shape, in terms of period and direction, of the future price curve. Let's look at the 50 day:



The 50 day, instead of showing various dips and rebounds along with price, progresses steadily upwards as price, ultimately, does too. It finally begins to peak as Bitcoin breaks 10,000; a few days later, Bitcoin peaks too. This would seem to validate the idea that longer moving averages make better long term trend indicators.

Conclusion

We have seen that TradeBot's time stamped variants accurately predicted the better part of Bitcoin's recent price movements; and their moving averages painted the Bitcoin price curve fairly well, in advance of it actually happening. These results speak to the validity of the TradeBot system.

There are many optimizations not only in prediction making but in trading strategy that could improve TradeBot's performance. The simple 0 and 1 test, while a good way to test predictive power, could be augmented with both human intelligence and automated profit taking or stop loss type risk avoidance. As TradeBot develops we will explore these possibilities.

The future for TradeBot as a prediction engine holds many possibilities, but short term goals are to add more regressions, more features, and more deeply test different control variables. Increasing the volume of data we collect will let us predict to a finer degree the various movements in Bitcoin's price, and get closer to understanding Bitcoin's future.