# DOUBLE BOTTOM BABY

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# executive summary

- we wanted to be able to define our own events- not some pre-defined baseline identifiers out there
- we want to know exactly what it meant to be able to identify a price event- a black box calculation just won't do
- after identifying the event, we want to predict where the price will go- up or down

# DATA COLLECTION AND PREPARATION PART 1: BRAIN STORMING

## *trading signals/events we were considering*

- **double bottoms**
  - easiest to accomplish in 2 weeks
- head and shoulders
- double top
- inverse head and shoulders

## *visual and daxta references*

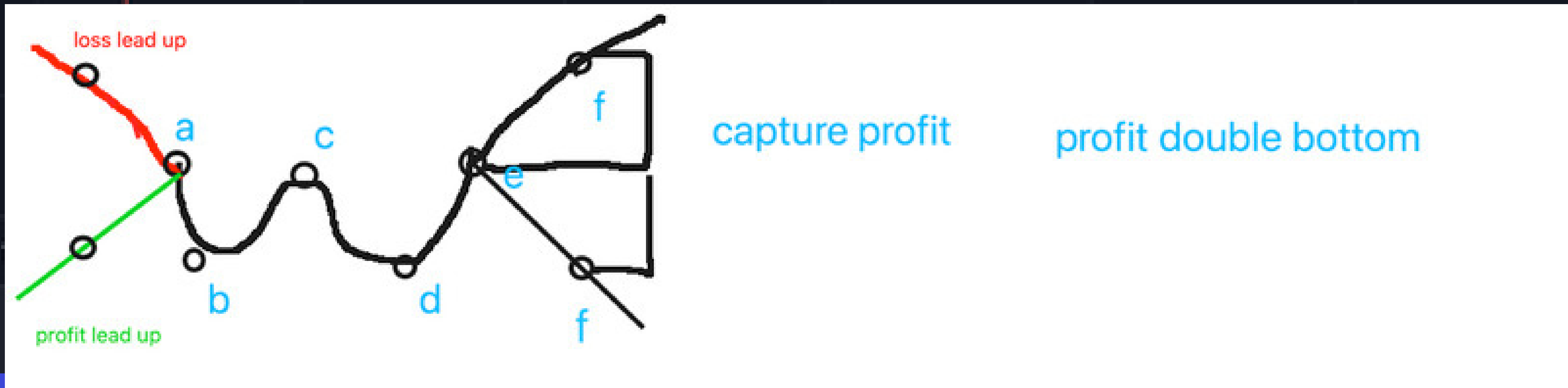
- **trading view**
  - easily visually identify events
- **yahoo finance**
  - good starting point
- **binance**
  - collect large dataset easily
- coinbase

WE NEED TWO MODELS:

FIRST- IDENTIFY AN EVENT

SECOND- PREDICT PRICE MOVEMENT

OxCartDdam published on TradingView.com, Oct 03, 2021 17:11 UTC-4
Bitcoin / U.S. Dollar, 1h, COINBASE O48463.63 L47733.31 C48151.85 -298.73 (-0.62%)
MA (15, close, 0)
MA (100, close, 0)
DEMA (9, close)
The double bottom turnaround is established after a candle touches the range previously created. At that point, the previous local max is made the midpoint.
At the close of this candle, we enter a call option since the candle closed above the range of the midpoint.
Here is the creation of a local min. The value is stored and the algo iterates over next candles to find strat
This candle closes in the range and makes the right portion of the double bottom. This is now the midpoint.
18:00
29
06:00
12:00
TradingView

loss lead up
profit lead up
a
b
c
d
e
f
f
capture profit
profit double bottom

| | event_number | leadup | a | b | c | d | e | f |
|---|---|---|---|---|---|---|---|---|
| train | e1 | x | x | x | x | x | x | y |
| | e2 | x | x | x | x | x | x | y |
| | e3 | x | x | x | x | x | x | y |
| | e4 | x | x | x | x | x | x | y |
| | e5 | x | x | x | x | x | x | y |
| | e6 | x | x | x | x | x | x | y |
| test | e5 | x | x | x | x | x | x | y |
| | e6 | x | x | x | x | x | x | y |

# DATA COLLECTION AND PREPARATION PART 2: ETL

*step 1*

what data points make up an event

*step 2*

how do we define each point with code logic

*step 3*

can we automate this for multiple events

```
{0: [Timestamp('2017-11-19 00:00:00'),
  Timestamp('2017-11-20 00:00:00'),
  Timestamp('2017-11-21 00:00:00'),
  Timestamp('2017-11-22 00:00:00'),
  Timestamp('2017-11-24 00:00:00')],
 1: [Timestamp('2018-03-27 00:00:00'),
  Timestamp('2018-03-29 00:00:00'),
  Timestamp('2018-03-30 00:00:00'),
  Timestamp('2018-03-31 00:00:00'),
  Timestamp('2018-04-01 00:00:00')],
 2: [Timestamp('2018-08-04 00:00:00'),
  Timestamp('2018-08-07 00:00:00'),
  Timestamp('2018-08-08 00:00:00'),
  Timestamp('2018-08-09 00:00:00'),
  Timestamp('2018-08-16 00:00:00')],
 3: [Timestamp('2018-09-26 00:00:00'),
  Timestamp('2018-09-28 00:00:00'),
  Timestamp('2018-09-29 00:00:00'),
  Timestamp('2018-10-02 00:00:00'),
  Timestamp('2018-10-04 00:00:00')],
 4: [Timestamp('2019-01-23 00:00:00'),
  Timestamp('2019-01-28 00:00:00'),
  Timestamp('2019-02-01 00:00:00'),
  Timestamp('2019-02-06 00:00:00'),
  Timestamp('2019-02-07 00:00:00')],
 5: [Timestamp('2019-02-22 00:00:00'),
  Timestamp('2019-02-23 00:00:00'),
  Timestamp('2019-02-24 00:00:00'),
  Timestamp('2019-03-03 00:00:00'),
  Timestamp('2019-03-04 00:00:00')],
 6: [Timestamp('2019-03-19 00:00:00'),
  Timestamp('2019-03-20 00:00:00'),
  Timestamp('2019-03-22 00:00:00'),
  Timestamp('2019-03-24 00:00:00'),
  Timestamp('2019-03-26 00:00:00')],
```

| | Date | Open | Low | High | Close | Volume | Max | Min | A | B | C | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2017-11-24 | 8138.99 | 8090.00 | 8734.78 | 8700.01 | 4292.623682 | 0.0 | 0.0 | 8212.00 | 8119.51 | 8205.92 | 8019.99 |
| 1 | 2018-04-01 | 6813.01 | 6765.00 | 7125.00 | 7056.00 | 32123.560072 | 0.0 | 0.0 | 7949.30 | 6840.23 | 6923.91 | 6813.01 |
| 2 | 2018-08-16 | 6316.00 | 6285.40 | 6585.00 | 6584.49 | 57851.610803 | 1.0 | 0.0 | 7024.19 | 6285.00 | 6529.79 | 6144.01 |
| 3 | 2018-10-04 | 6591.69 | 6543.08 | 6697.00 | 6635.65 | 16096.552392 | 1.0 | 0.0 | 6689.13 | 6596.38 | 6626.57 | 6510.00 |
| 4 | 2019-02-07 | 3398.40 | 3373.10 | 3733.58 | 3659.04 | 47968.058013 | 0.0 | 0.0 | 3569.62 | 3411.04 | 3504.77 | 3398.40 |
| 5 | 2019-03-04 | 3716.10 | 3703.55 | 3877.10 | 3857.73 | 32962.536162 | 0.0 | 0.0 | 4117.76 | 3743.56 | 3827.92 | 3715.30 |
| 6 | 2019-03-26 | 3948.77 | 3936.15 | 4048.00 | 4038.05 | 32364.555852 | 1.0 | 0.0 | 4043.04 | 3980.64 | 4006.01 | 3936.12 |
| 7 | 2019-07-29 | 9509.07 | 9402.00 | 9714.28 | 9574.21 | 32536.368834 | 0.0 | 0.0 | 9879.87 | 9476.52 | 9541.54 | 9507.64 |
| 8 | 2019-08-18 | 10306.17 | 10258.60 | 10930.00 | 10915.54 | 37243.319217 | 1.0 | 0.0 | 11549.97 | 10050.37 | 10331.54 | 10216.02 |
| 9 | 2019-09-29 | 8043.04 | 7710.00 | 8337.26 | 8289.34 | 55865.487260 | 0.0 | 0.0 | 10415.01 | 8063.73 | 8198.81 | 8043.82 |
| 10 | 2019-11-03 | 9196.46 | 9115.84 | 9513.68 | 9393.35 | 45894.456277 | 1.0 | 0.0 | 9407.62 | 9140.85 | 9289.52 | 9194.71 |
| 11 | 2019-11-26 | 7154.75 | 6840.00 | 7655.00 | 7508.52 | 92452.873490 | 1.0 | 0.0 | 9289.52 | 7268.23 | 7311.57 | 6903.28 |
| 12 | 2020-01-25 | 8340.01 | 8293.66 | 8618.13 | 8615.00 | 31130.485164 | 0.0 | 0.0 | 8736.03 | 8404.52 | 8439.00 | 8340.58 |

# APPROACH

*concept: event*

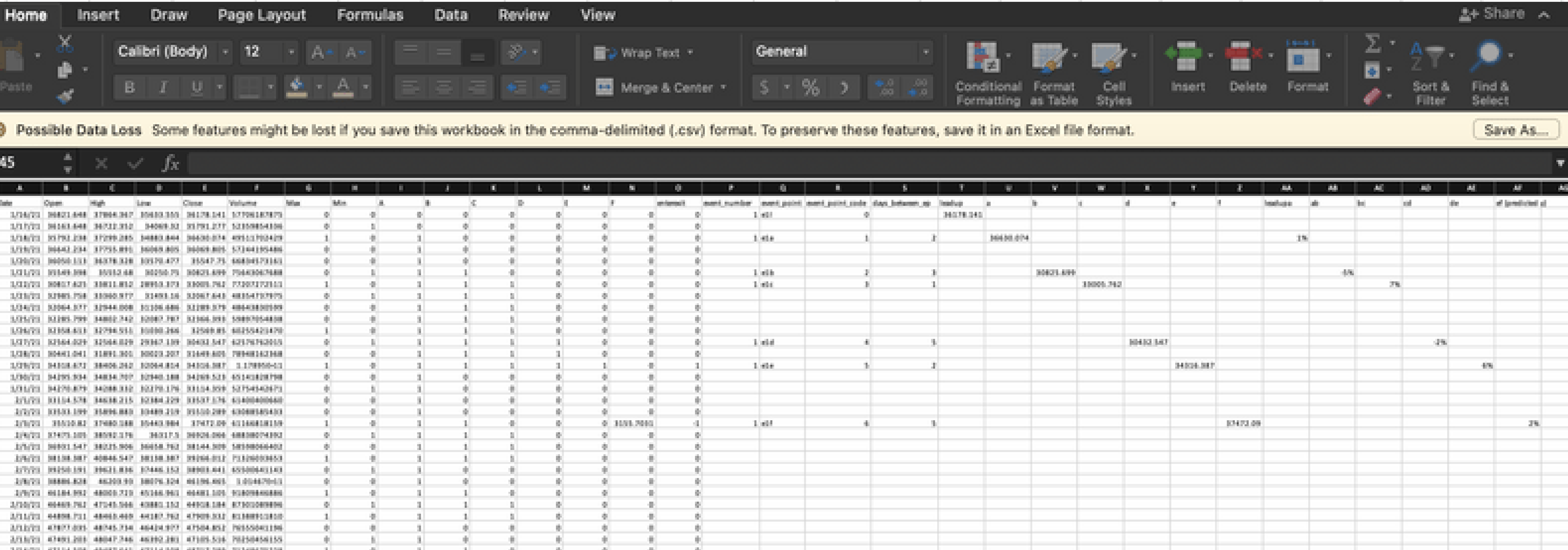
*actual: event*

*concept: NN dataframe*

*actual: NN datafram*

## double bottom dataframe

| Start date | o | c | h | l | a | b | c | d | e | f | Is this a double bottom? | leadup | what event point | leadup-a | a-b | b-c | c-d | d-e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| xxxx/xx/xx | x | x | x | x | | | | | | | | | leadup | | | | | |
| xxxx/xx/xx | x | x | x | x | x | | | | | | | | a | | | | | |
| xxxx/xx/xx | x | x | x | x | x | x | | | | | | | b | | | | | |
| xxxx/xx/xx | x | x | x | x | x | x | x | | | | | | c | | | | | |
| xxxx/xx/xx | x | x | x | x | x | x | x | x | | | | | d | | | | | |
| xxxx/xx/xx | x | x | x | x | x | x | x | x | x | | | | e | | | | | |
| xxxx/xx/xx | x | x | x | x | x | x | x | x | x | x | yes! | =point a minus one day | f | x | x | x | x | x |

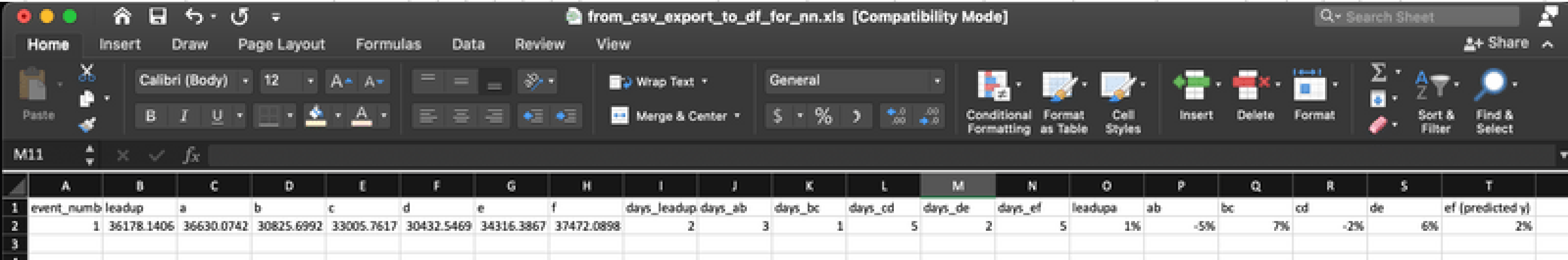


| Data pulled from event-identifying ML model | | Engineered features to feed into our neural net |
|---|---|---|

- From model #1:
  - 7 independent variables
- For model #2:
  - 19 features

**the final dataframe to feed into the NN or ML algorithm**

| | event_number | leadup | a | b | c | d | e | f | days_leadupa | days_ab | days_bc | days_cd | days_de | days_ef | leadupa | ab | bc | cd | de | ef (predicted y) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| train | e1 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| | e2 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| | e3 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| | e4 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| | e5 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| | e6 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| test | e5 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |
| | e6 | x | x | x | x | x | x | y | n | n | n | n | n | n | % | % | % | % | % | % |




| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | event_numb | leadup | a | b | c | d | e | f | days_leadup | days_ab | days_bc | days_cd | days_de | days_ef | leadupa | ab | bc | cd | de | ef (predicted y) |
| 2 | 1 | 36178.1406 | 36630.0742 | 30825.6992 | 33005.7617 | 30432.5469 | 34316.3867 | 37472.0898 | 2 | 3 | 1 | 5 | 2 | 5 | 1% | -5% | 7% | -2% | 6% | 2% |
| 3 | | | | | | | | | | | | | | | | | | | | |

# RESULTS/CONCLUSIONS PART 1: ML RESULTS FOR IDENTIFYING DOUBLE BOTTOM EVENTS

*identifying events visually*

*defining events in code*

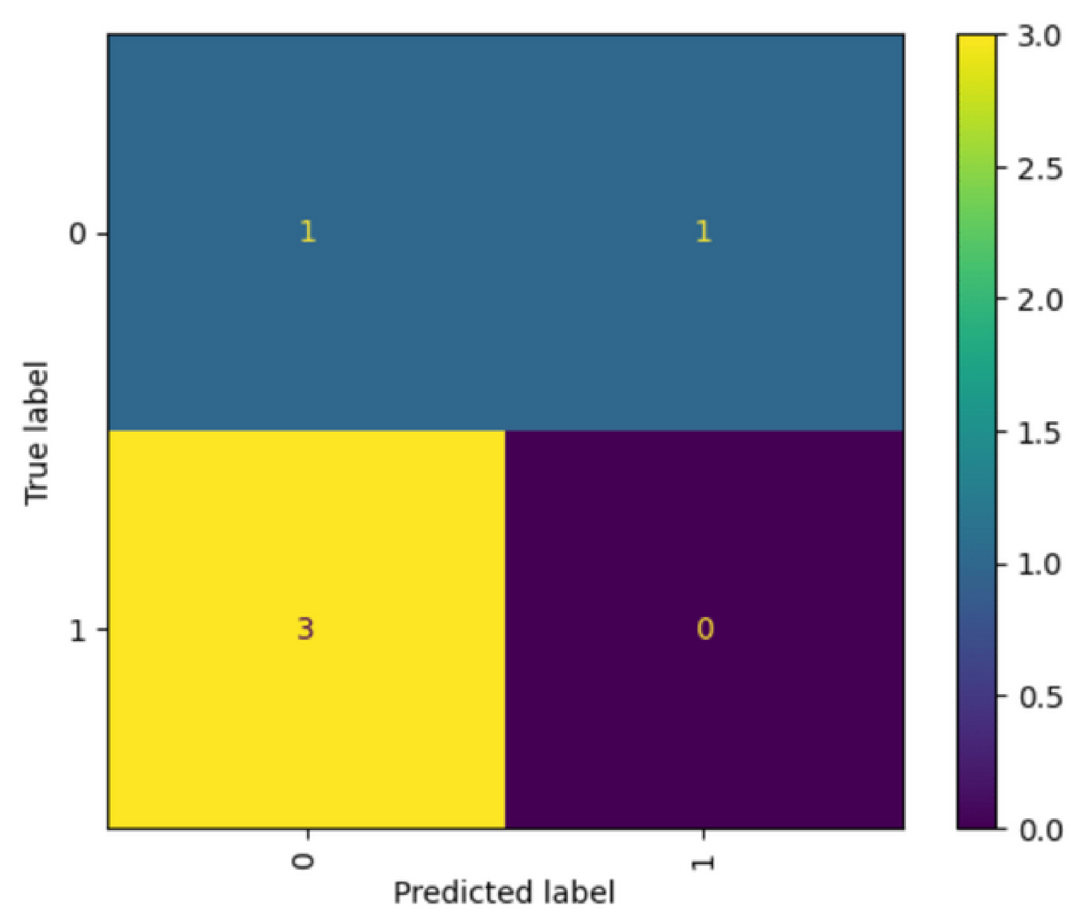
*automating event identification*

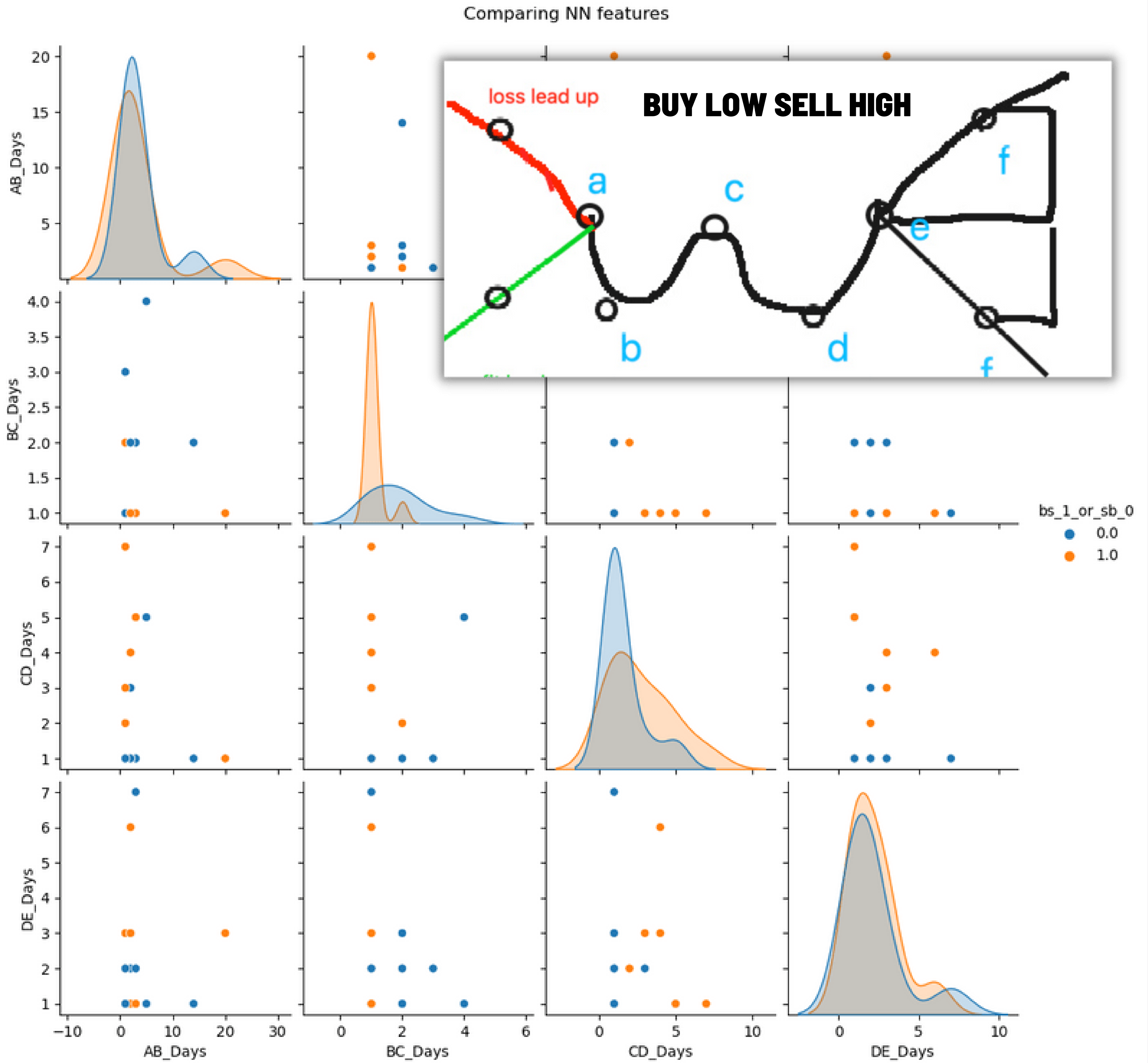
# RESULTS/ CONCLUSION PART 2:

# NEURAL NET FOR PREDICTING PRICE MOVEMENTS FOR TRADING ENTRY AND EXIT

| Weight | Feature |
|---|---|
| 0.1500 ± 0.2449 | AB_Days |
| 0.0500 ± 0.2000 | AB_Vert |
| 0 ± 0.0000 | CD_percent_change_per_day |
| 0 ± 0.0000 | A |
| 0 ± 0.0000 | B |
| 0 ± 0.0000 | C |
| 0 ± 0.0000 | D |
| 0 ± 0.0000 | E |
| 0 ± 0.0000 | BC_Days |
| 0 ± 0.0000 | CD_Days |
| 0 ± 0.0000 | DE_Days |
| 0 ± 0.0000 | DE_percent_change_per_day |
| 0 ± 0.0000 | BC_Vert |
| 0 ± 0.0000 | CD_Vert |
| 0 ± 0.0000 | DE_Vert |
| 0 ± 0.0000 | BC_avg_change_per_day |
| 0 ± 0.0000 | CD_avg_change_per_day |
| 0 ± 0.0000 | DE_avg_change_per_day |
| 0 ± 0.0000 | AB_percent_change_per_day |
| 0 ± 0.0000 | BC_percent_change_per_day |
| 0 ± 0.0000 | event_number |
| -0.1500 ± 0.2449 | AB_avg_change_per_day |

| Weight | Feature |
|---|---|
| 0 ± 0.0000 | DE_percent_change_per_day |
| 0 ± 0.0000 | C |
| 0 ± 0.0000 | AB_Days |
| 0 ± 0.0000 | BC_Days |
| 0 ± 0.0000 | CD_Days |
| 0 ± 0.0000 | DE_Days |
| 0 ± 0.0000 | CD_percent_change_per_day |
| 0 ± 0.0000 | BC_Vert |
| 0 ± 0.0000 | DE_Vert |
| 0 ± 0.0000 | D |
| 0 ± 0.0000 | AB_avg_change_per_day |
| 0 ± 0.0000 | BC_avg_change_per_day |
| 0 ± 0.0000 | B |
| 0 ± 0.0000 | A |
| 0 ± 0.0000 | AB_percent_change_per_day |
| 0 ± 0.0000 | BC_percent_change_per_day |
| 0 ± 0.0000 | E |
| -0.0500 ± 0.2000 | AB_Vert |
| -0.0500 ± 0.2000 | CD_Vert |
| -0.0500 ± 0.2000 | DE_avg_change_per_day |
| -0.1500 ± 0.2449 | CD_avg_change_per_day |
| -0.2000 ± 0.2000 | event_number |




```
pipeline103 = make_pipeline(
    ce.OrdinalEncoder(),
    XGBClassifier(booster= 'gbtree',n_estimators=30, max_depth=5,
                  random_state=30,
                  n_jobs=-1)
```

```
y_test.tolist()
```

```
['0', '1', '1', '1', '0']
```

```
y_pred_103 = pipeline103.predict(X_test)
y_pred_103
```

```
array(['0', '0', '0', '0', '1'], dtype=object)
```

- event point B to event point C
  - the lower the number of days, the more likely there is price increase, buy at e sell at f
- event point C to event point D
  - the lower the number of days, the more likely price will decrease- sell at e and buy at f



**NEXT STEPS; WHAT DID WE LEARN:**

**WHAT DO WE WISH WE COULD HAVE DONE:**

**WHAT COULD HAVE DONE BETTER**

*GITHUB:*
*https://github.com/bitcoin-candlestick-ML*

*TEAM MEMBERS:*
*Babajide Ademola*
*David Ingraham*
*Shannon Li*
*Joshua Maddox (JP)*

# APPENDIX AND CREDITS