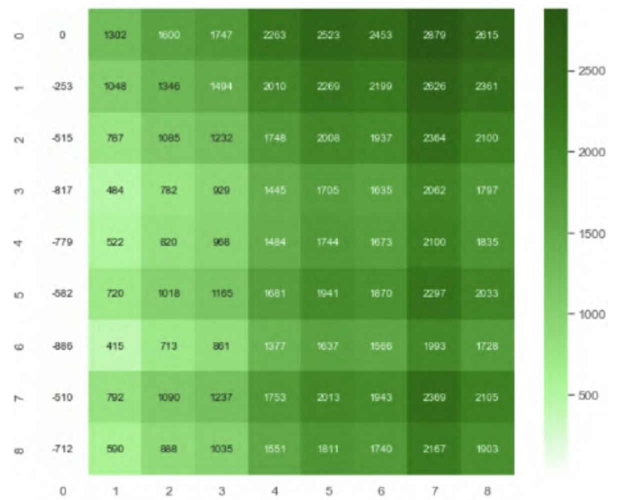
Model changelog:

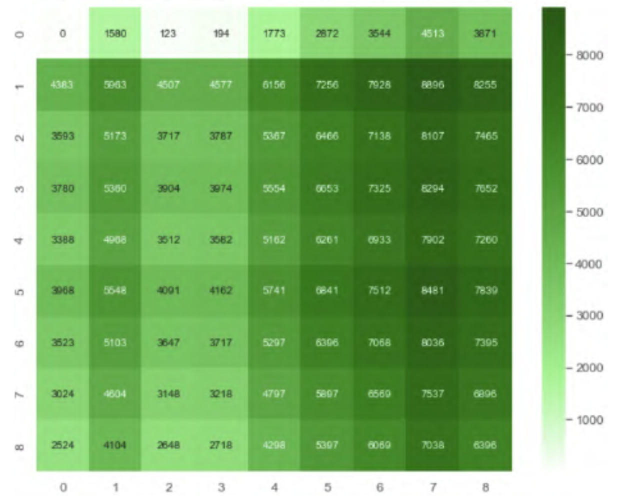
1. Add statistics aggregated by day (e.g. **Sharp ratio is [2..4] if calculated by day**)
2. Add different position close after based on long/short signal (Fear drives emotions faster than greed, so sell-offs happen suddenly)
3. Add handling for concurrent trades. If the simulation I have allowed maximum of **5 maximum concurrent** trades (thus maximum allocation is **5 * allocation_by_trade**)
4. Add best probability threshold selection based on sharp ratio/mean profit per trade (previously it was based on profit)
5. Add back-testing only during regular trading time
6. Add simulation to calculation of optimal time for closing long/short position, e.g.:
    a. If we take articles with high probability,

optimal time is after **~2** minutes for long positions and **~7** minutes for short positions

    a. If we take articles with lower probability,

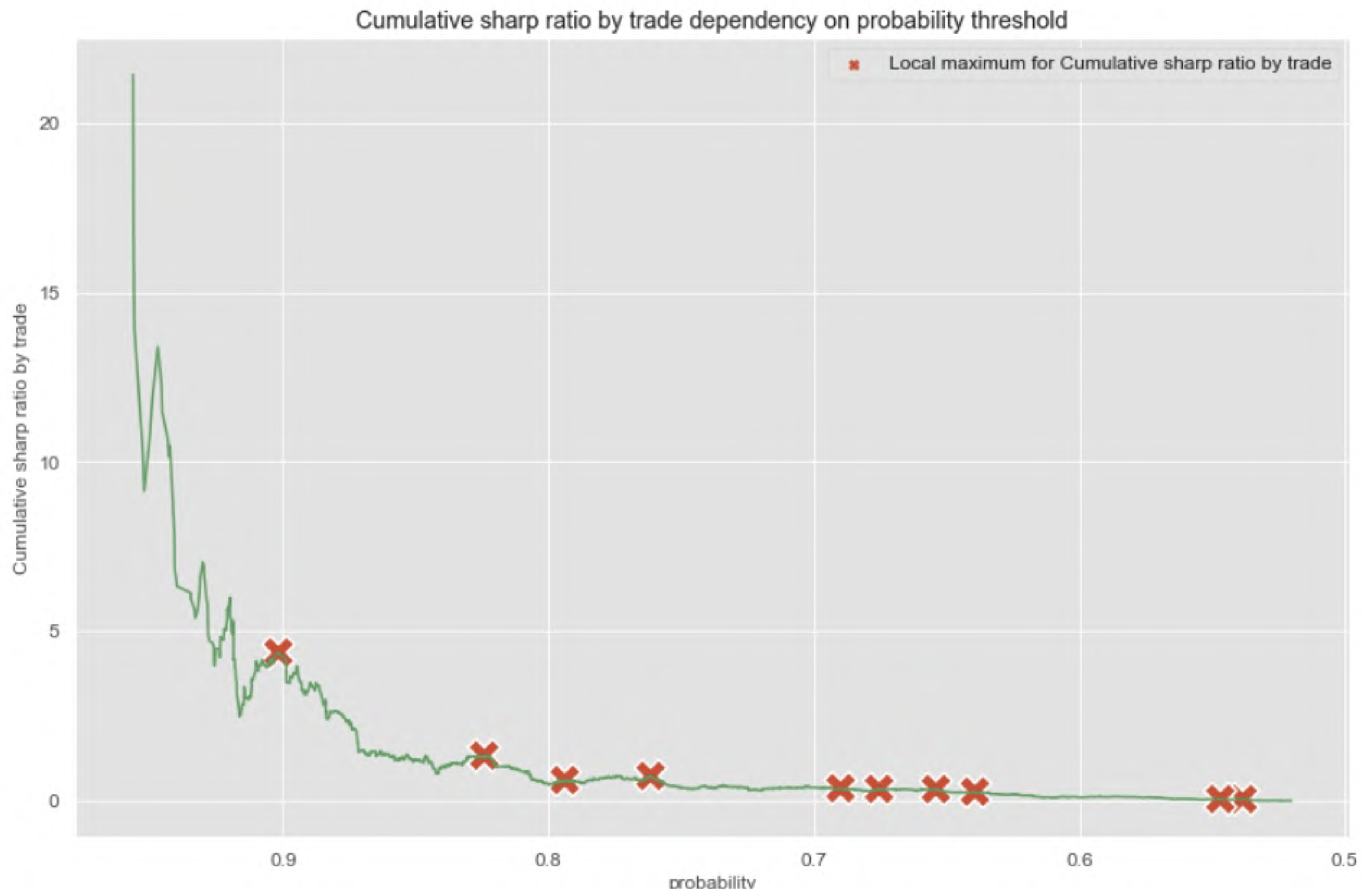
optimal time is after **~7** minutes for long positions and **~7** minutes for short positions



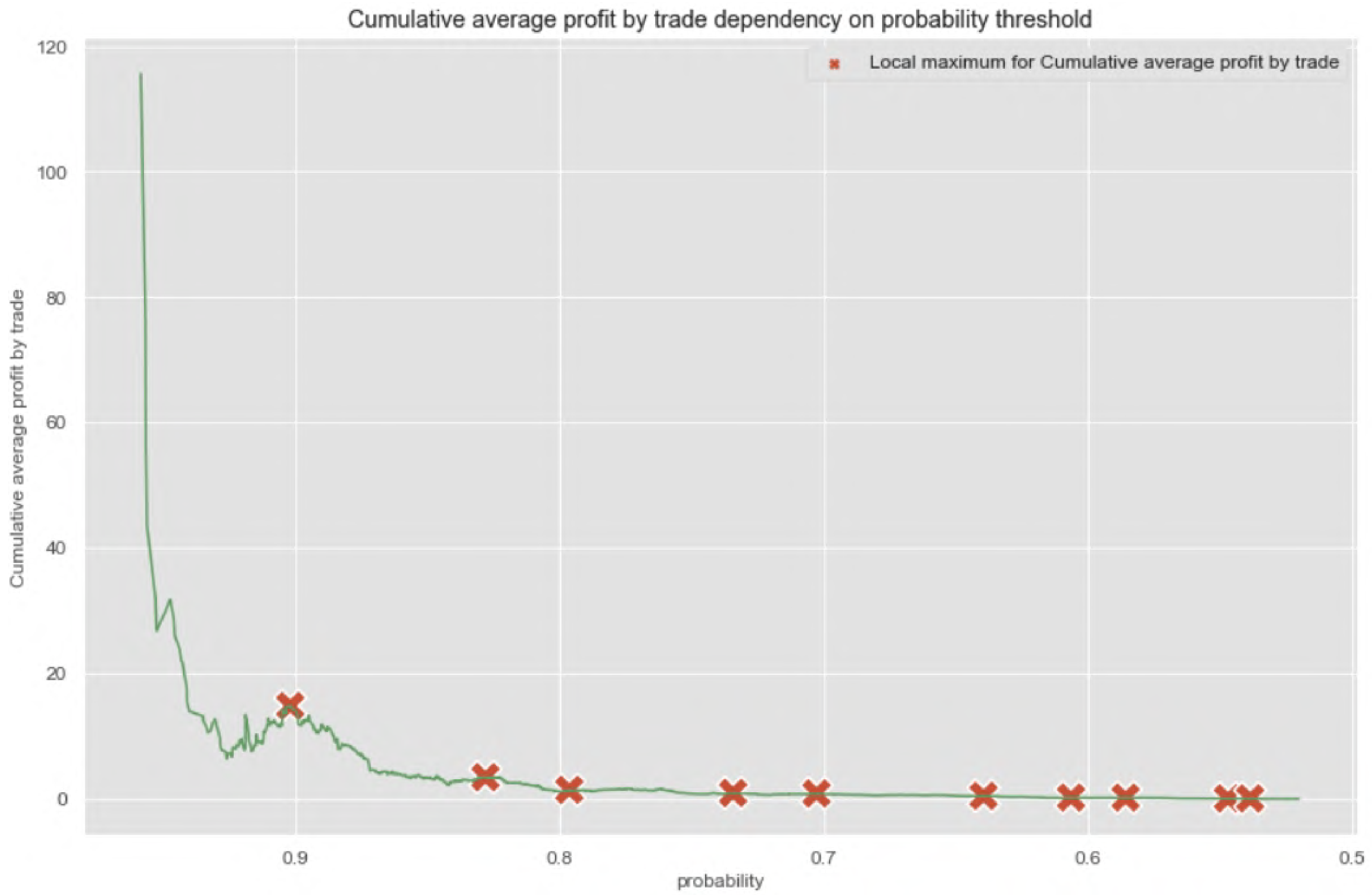


Strategy from 9:30 a.m. to 4:00 p.m ET

2nd strategy



average_profit_by_trade	14.93	3.71	1.96	2.25
probability_cutoff	0.90	0.82	0.79	0.76
trades	138.00	650.00	905.00	1222.00
profit	2060.01	2409.94	1776.72	2754.20
Sharpe Ratio by day	6.07	3.68	2.52	3.44
Sharpe Ratio by trade	4.37	1.37	0.78	1.02



average_profit_by_trade	14.93	3.72	1.62	1.21	1.39
probability_cutoff	0.90	0.83	0.80	0.73	0.70
trades	138.00	616.00	887.00	1509.00	1873.00
profit	2060.01	2293.67	1434.75	1829.76	2608.03
Sharpe Ratio by day	6.07	3.35	2.01	2.13	2.91
Sharpe Ratio by trade	4.37	1.34	0.66	0.58	0.72

Based on that we see the best results is with cutoff = [0.9, 0.76]

Strategy from 9:30 a.m. to 4:00 p.m ET

2nd strategy simulation statistics with probability_cutoff = 0.9

probability_cutoff	0.9002
trades	146.0000
profit	2099.4984
profit per $ traded	0.0144
profitable_trades_%	0.4600
profitable_trades	67.0000
average_profit_by_trade	14.3801
median_profit_by_trade	0.0000
std_profit	52.8790
max_profit	352.6316
unprofitable_trades	46.0000
max_unprofit	-88.1459
profitable_days	33.0000
unprofitable_days	22.0000
mean_profit_per_day	34.9916
profitable_days_ratio	0.6000
Sharpe Ratio by day	6.0800
Sharpe Ratio by trade	4.3200
maxDD calc. by trade	-133.0000
maxDD calc. by day	-65.0000
maxDD days duration	7.0000

	trades	average_profit_by_trade	Sharpe Ratio by day	Sharpe Ratio by trade
Consumer Cyclical	16	3.5912	1.77	1.60
Energy	7	6.1516	1.89	1.89
Industrials	9	37.8926	5.54	4.90
Healthcare	67	15.3052	5.65	4.73
Technology	23	18.4911	8.12	7.85

Pitch

Strategy from 9:30 a.m. to 4:00 p.m ET

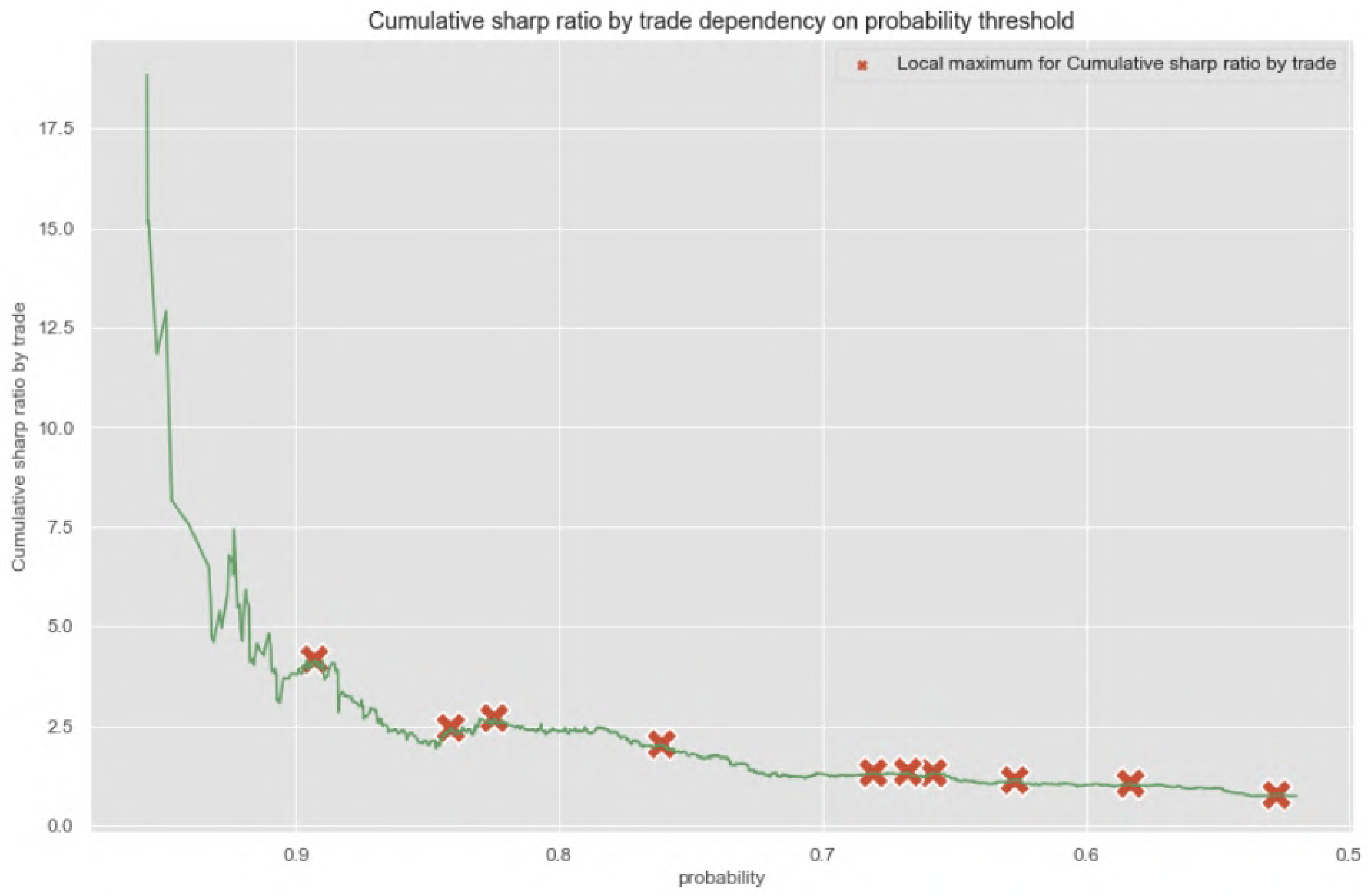
2nd strategy simulation statistics with probability_cutoff = 0.76

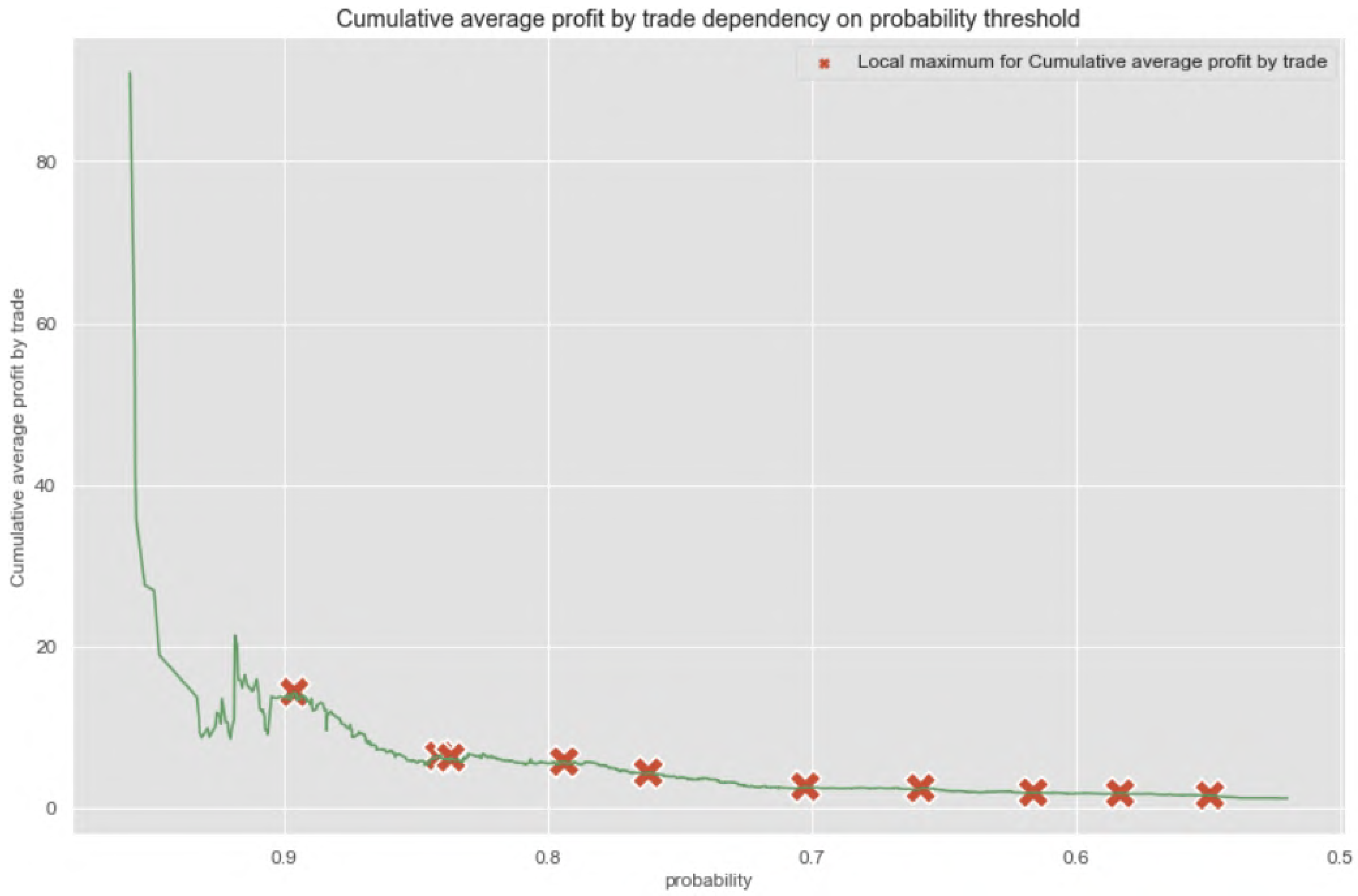
probability_cutoff	0.7601
trades	1239.0000
profit	2844.1460
profit per $ traded	0.0023
profitable_trades_%	0.4100
profitable_trades	505.0000
average_profit_by_trade	2.2955
median_profit_by_trade	-0.0000
std_profit	34.4615
max_profit	352.6316
unprofitable_trades	451.0000
max_unprofit	-212.2449
profitable_days	41.0000
unprofitable_days	36.0000
mean_profit_per_day	36.9370
profitable_days_ratio	0.5325
Sharpe Ratio by day	3.6000
Sharpe Ratio by trade	1.0600
maxDD calc. by trade	-437.0000
maxDD calc. by day	-521.0000
maxDD days duration	3.0000

	trades	average_profit_by_trade	Sharpe Ratio by day	Sharpe Ratio by trade
Utilities	13	-9.7106	-5.91	-5.42
Financial Services	84	-4.2475	-1.87	-1.79
Real Estate	52	-2.4613	-1.39	-1.19
Other	15	-0.3952	-0.77	-0.72
Communication Services	26	-0.7948	-0.64	-0.55
Basic Materials	52	-0.3669	-0.45	-0.35
Energy	66	0.7431	0.40	0.29
Healthcare	397	0.6508	0.61	0.29
Consumer Defensive	76	4.7737	2.53	1.89
Consumer Cyclical	167	2.6323	2.54	1.49
Technology	264	2.9000	2.65	1.28
Industrials	106	6.1230	2.86	1.97

Strategy from 9:30 a.m. to 4:00 p.m ET

1st strategy





average_profit_by_trade	13.41	6.40	6.49	4.44	2.39	2.39	2.05	1.90	1.91
probability_cutoff	0.89	0.84	0.82	0.76	0.68	0.67	0.66	0.63	0.58
trades	78.00	254.00	340.00	667.00	1180.00	1257.00	1335.00	1521.00	1811.00
profit	1046.20	1624.55	2208.02	2958.38	2821.05	2998.76	2741.31	2890.00	3459.65
Sharpe Ratio by day	4.88	4.54	5.68	5.98	4.97	5.21	4.98	5.37	5.51
Sharpe Ratio by trade	3.97	2.39	2.56	2.09	1.29	1.31	1.14	1.09	1.12

average_profit_by_trade	13.75	6.47	6.06	4.95	4.53	2.74	2.40
probability_cutoff	0.90	0.84	0.84	0.79	0.76	0.70	0.66
trades	71.00	251.00	282.00	484.00	661.00	1037.00	1327.00
profit	976.56	1624.96	1708.90	2396.68	2994.44	2845.39	3190.75
Sharpe Ratio by day	4.67	4.51	4.84	5.30	5.77	5.00	5.34
Sharpe Ratio by trade	3.96	2.40	2.36	2.16	2.08	1.43	1.31

Based on that we see the best results is with cutoff = [0.84, 0.76]

Strategy from 9:30 a.m. to 4:00 p.m ET

1st strategy simulation statistics with probability_cutoff = 0.84

probability_cutoff	0.8401
trades	262.0000
profit	1609.3602
profit per $ traded	0.0061
profitable_trades_%	0.5000
profitable_trades	130.0000
average_profit_by_trade	6.1426
median_profit_by_trade	0.0000
std_profit	42.0556
max_profit	291.3364
unprofitable_trades	113.0000
max_unprofit	-220.2678
profitable_days	48.0000
unprofitable_days	25.0000
mean_profit_per_day	22.0460
profitable_days_ratio	0.6575
Sharpe Ratio by day	4.5200
Sharpe Ratio by trade	2.3200
maxDD calc. by trade	-422.0000
maxDD calc. by day	-91.0000
maxDD days duration	3.0000

	trades	average_profit_by_trade	Sharpe Ratio by day	Sharpe Ratio by trade
Financial Services	5	-14.3946	-4.53	-4.53
Real Estate	5	-0.8094	-1.05	-1.05
Energy	7	-0.4289	-0.14	-0.14
Technology	63	0.8744	0.47	0.35
Healthcare	100	6.2815	3.57	2.48
Consumer Cyclical	28	12.3048	4.91	3.95
Industrials	12	29.4756	5.78	5.78
Consumer Defensive	18	8.3860	5.87	4.00
Basic Materials	6	10.5361	6.33	5.26

Strategy from 9:30 a.m. to 4:00 p.m ET

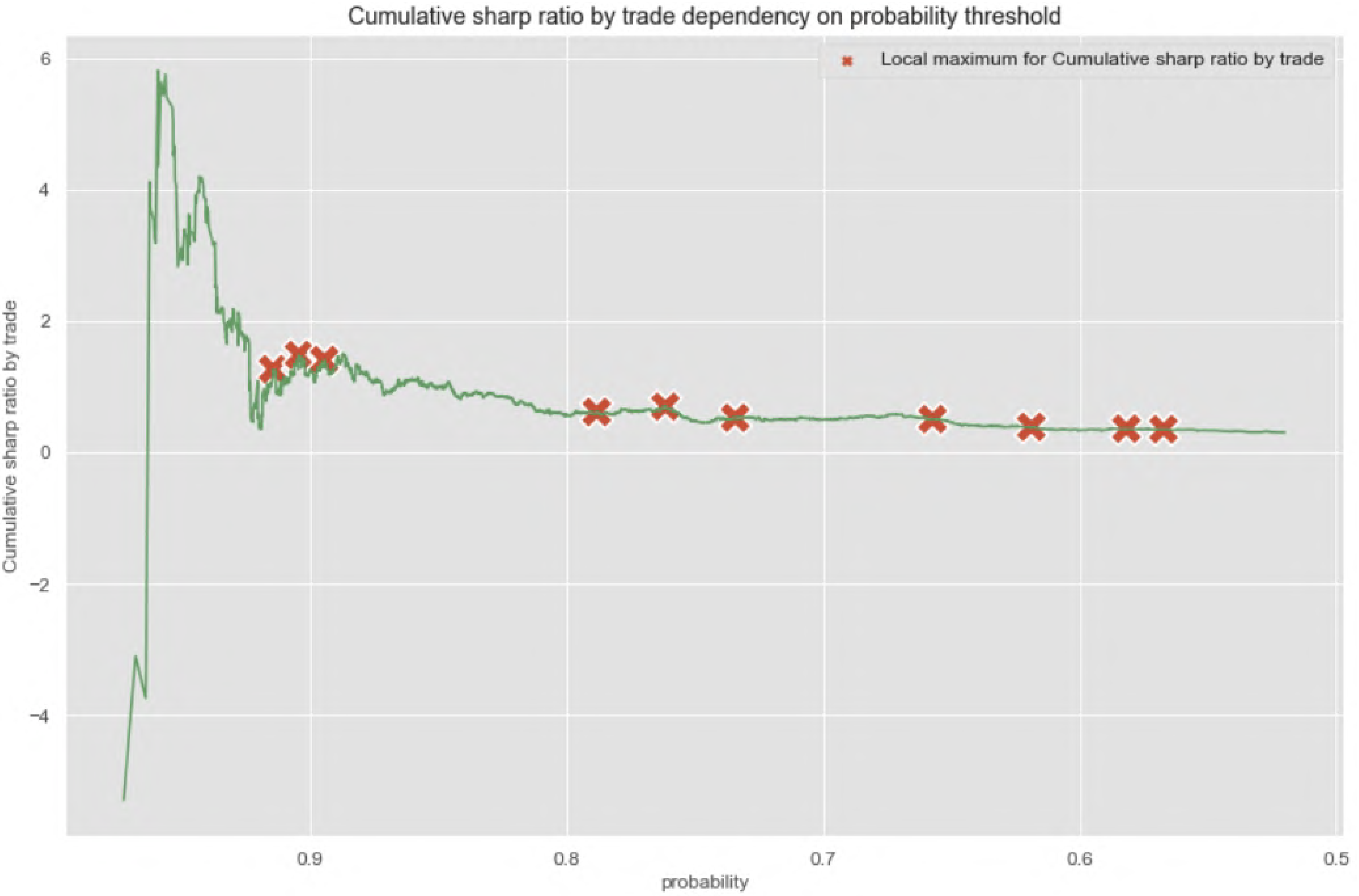
1st strategy simulation statistics with probability_cutoff = 0.76

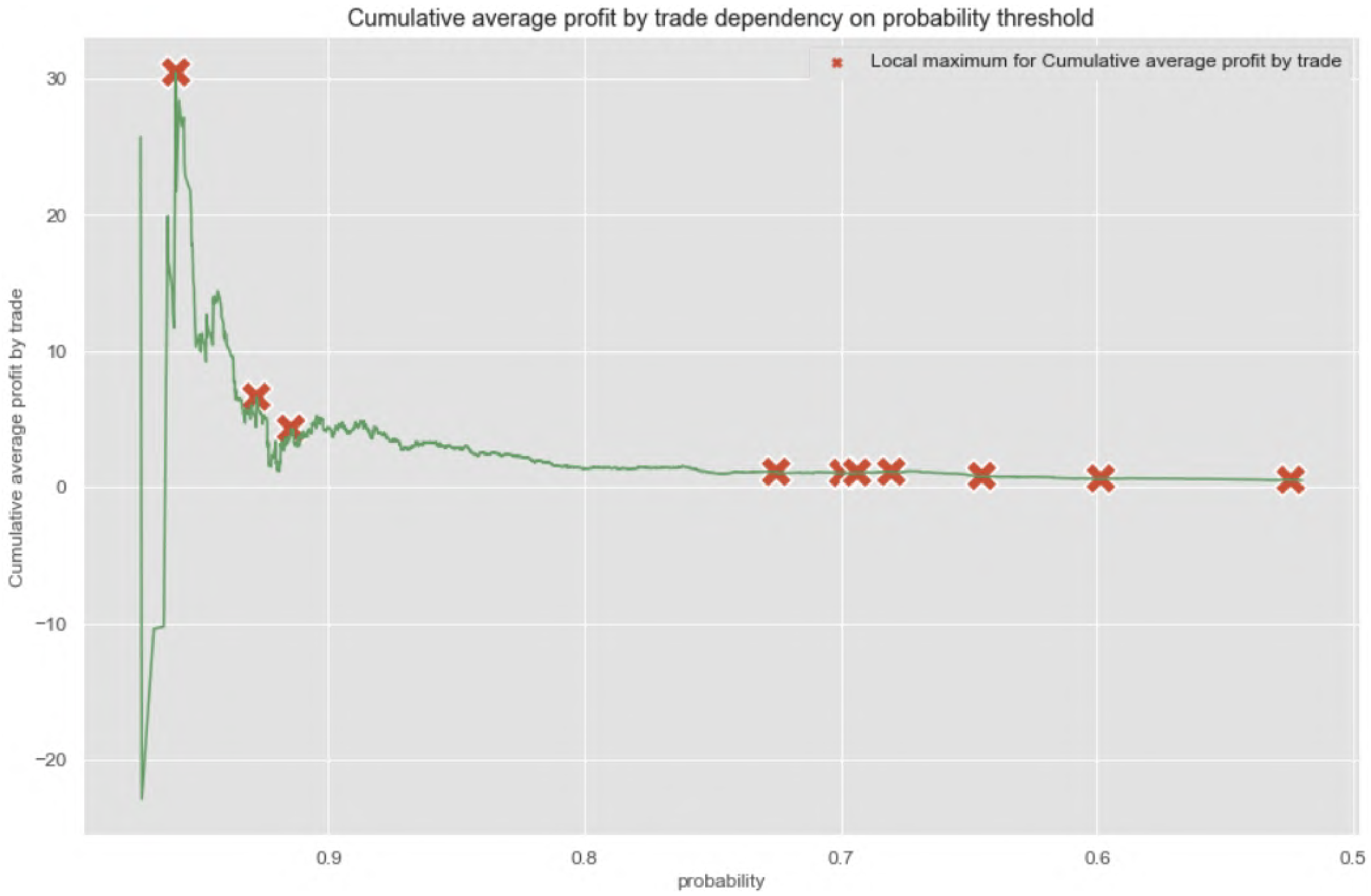
probability_cutoff	0.7601
trades	676.0000
profit	2698.2726
profit per $ traded	0.0040
profitable_trades_%	0.4900
profitable_trades	334.0000
average_profit_by_trade	3.9915
median_profit_by_trade	0.0000
std_profit	32.9910
max_profit	291.3364
unprofitable_trades	293.0000
max_unprofit	-220.2678
profitable_days	49.0000
unprofitable_days	27.0000
mean_profit_per_day	35.5036
profitable_days_ratio	0.6447
Sharpe Ratio by day	5.4600
Sharpe Ratio by trade	1.9200
maxDD calc. by trade	-306.0000
maxDD calc. by day	-273.0000
maxDD days duration	1.0000

	trades	average_profit_by_trade	Sharpe Ratio by day	Sharpe Ratio by trade
Other	5	-3.5093	-9.89	-7.45
Utilities	6	-0.4528	-0.27	-0.27
Energy	24	0.6161	0.43	0.23
Financial Services	34	3.5058	1.30	1.20
Consumer Defensive	46	3.5097	2.79	1.83
Industrials	45	8.5052	3.02	2.64
Technology	161	4.0044	3.28	1.90
Basic Materials	20	5.7439	3.65	2.71
Real Estate	19	4.8443	4.21	3.34
Healthcare	223	4.3647	4.35	2.38
Communication Services	9	3.7465	4.86	4.86
Consumer Cyclical	77	7.8772	5.56	3.67

Strategy with all tickers and pre- and after-market

2nd strategy is optimal for this case





average_profit_by_trade	3.99	5.13	5.32	1.72	1.60	1.76	1.27	1.14
probability_cutoff	0.91	0.90	0.89	0.80	0.78	0.77	0.73	0.67
trades	315.00	467.00	623.00	2707.00	3183.00	3722.00	4726.00	6309.00
profit	1255.37	2396.12	3315.47	4655.83	5096.88	6554.33	6017.42	7172.98
Sharpe Ratio by day	2.52	3.66	4.44	3.89	4.18	5.23	4.39	5.47
Sharpe Ratio by trade	1.18	1.45	1.60	0.69	0.67	0.78	0.61	0.58

average_profit_by_trade	11.69	6.39	3.99	3.01	1.76	1.45	1.41	1.09
probability_cutoff	0.96	0.93	0.91	0.84	0.77	0.73	0.72	0.68
trades	10.00	156.00	315.00	1887.00	3722.00	4839.00	5056.00	6198.00
profit	116.92	996.52	1255.37	5673.34	6554.33	7031.37	7110.39	6764.18
Sharpe Ratio by day	3.19	3.60	2.52	5.00	5.23	5.52	5.23	4.66
Sharpe Ratio by trade	3.19	2.05	1.18	1.08	0.78	0.70	0.67	0.55

Based on that we see the best results are with cutoff = [0.93, 0.91, 0.84,0.73]

Strategy with all tickers and pre- and after-market

simulation statistics with probability_cutoff = 0.93, 0.91, 0.84 and 0.73

probability_cutoff	0.9301	0.9100	0.8400	0.7300
trades	141.0000	375.0000	1763.0000	4697.0000
profit	847.1895	1474.1976	5173.3671	5582.7196
profit per $ traded	0.0060	0.0039	0.0029	0.0012
profitable_trades_%	0.4000	0.4000	0.3700	0.3600
profitable_trades	56.0000	149.0000	656.0000	1673.0000
average_profit_by_trade	6.0084	3.9312	2.9344	1.1886
median_profit_by_trade	-0.0000	-0.0000	0.0000	-0.0000
std_profit	43.9621	56.2814	46.0889	34.0678
max_profit	217.8771	352.6316	352.6316	352.6316
unprofitable_trades	43.0000	130.0000	604.0000	1594.0000
max_unprofit	-136.6120	-307.9667	-344.2623	-344.2623
profitable_days	33.0000	41.0000	47.0000	43.0000
unprofitable_days	22.0000	29.0000	30.0000	34.0000
mean_profit_per_day	13.2373	19.6560	67.1866	72.5029
profitable_days_ratio	0.6000	0.5857	0.6104	0.5584
Sharpe Ratio by day	3.5300	2.5800	4.5000	4.4300
Sharpe Ratio by trade	2.1700	1.1100	1.0100	0.5500
maxDD calc. by trade	-253.0000	-595.0000	-932.0000	-1184.0000
maxDD calc. by day	-189.0000	-420.0000	-425.0000	-594.0000
maxDD days duration	3.0000	2.0000	3.0000	9.0000

Pitch