

## 比特幣以時間序列作為預測實驗記錄

- 資料集：全部歷史資料、去除前兩年歷史資料、去除前四年歷史資料
- 測試集：30%、20%、10%、7 筆
- 基礎模型：線性回歸(LR)、支持向量機(SVM)、隨機森林(RF)、Holt-Winters(HW)、ARIMA、Prophet
- 指標：MAE、RMSE
- 合計：3\*4\*6=72 個組合
- 實際收益：假設一直持有該金融產品，測試集中持有最後一天價格減去持有第一天價格，以符合正情況。
- 預期收益：使用該預測模型進行買賣金融產品，如預測明天會漲，則今天就買進，反之。其中包括獲利與止損。

- 比特幣全部歷史資料(測試集=30%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>92.4403</b>	<b>136.9155</b>	16280.2714	20772.2527	11.1660	25.9078
SVM	135.1549	295.1449	<b>912.4505</b>	<b>1365.1765</b>	11.1660	-44.2423
RF	137.7124	289.4985	956.6456	1394.8989	11.1660	-25.1117
HW	298.4938	581.7033	1888.4202	2655.0415	11.1660	61.3694
ARIMA	134.6812	292.9861	16727.4768	21144.4220	11.1660	-32.2823
Prophet	951.4799	1456.9989	18831.0226	23806.2874	11.1660	-54.3303

- 比特幣全部歷史資料(測試集=20%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>282.9675</b>	<b>406.3982</b>	5141.4172	5603.3220	-50.0142	13.5845
SVM	299.1729	715.7188	1207.4761	1435.4923	-50.0142	30.1615
RF	299.4418	720.6602	<b>871.2547</b>	<b>1141.5552</b>	-50.0142	44.1637
HW	619.4679	1415.7438	1425.1652	1968.2855	-50.0142	30.3056
ARIMA	291.9234	720.4557	32147.3485	34092.6781	-50.0142	-16.5843
Prophet	2808.1543	4352.5959	59365.1517	64822.6680	-50.0142	-51.0586

- 比特幣全部歷史資料(測試集=10%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>307.6436</b>	<b>435.5870</b>	1563.4940	1976.8621	32.5272	24.0570
SVM	361.7959	802.0467	<b>374.0793</b>	<b>563.6780</b>	32.5272	5.9714

RF	364.9187	805.2678	378.3588	565.6379	32.5272	-3.3879
HW	769.1125	1576.8874	908.0036	1216.9369	32.5272	5.7033
ARIMA	357.9975	803.3335	5313.6661	6430.5176	32.5272	-5.4960
Prophet	2992.0678	4425.4472	8003.9794	9065.4144	32.5272	-0.8223

● 比特幣全部歷史資料(測試集=7)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>299.8742</b>	<b>419.9437</b>	202.1724	240.5839	59.2500	23.7546
SVM	363.7813	782.1170	177.5363	260.7088	59.2500	113.9629
RF	364.8807	785.2084	<b>163.1277</b>	<b>256.4969</b>	59.2500	113.9629
HW	783.5873	1545.4479	619.1845	738.4078	59.2500	137.9043
ARIMA	360.0922	783.4747	228.8358	293.9485	59.2500	-91.6634
Prophet	3392.8547	5151.0740	13743.3535	13747.5065	59.2500	-59.2500

● 比特幣歷史資料去除前兩年(測試集=30%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>266.5376</b>	<b>389.8285</b>	5142.8048	5944.5961	-2.6383	30.0183
SVM	347.2656	765.6565	1147.0644	1413.7620	-2.6383	37.2278
RF	349.8536	757.9405	<b>861.0209</b>	<b>1204.8450</b>	-2.6383	16.4954
HW	762.6160	1514.3655	1571.0243	2212.5570	-2.6383	21.9331
ARIMA	347.4149	764.6884	10571.0182	12752.8289	-2.7898	16.0874
Prophet	3114.2710	4524.8053	64351.3929	73707.6464	-2.7898	11.3744

● 比特幣歷史資料去除前兩年(測試集=20%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>325.9556</b>	<b>472.3749</b>	6326.9336	6718.4269	-29.6603	41.5333
SVM	456.8791	922.3858	<b>638.1438</b>	<b>841.7617</b>	-29.6603	-13.4393
RF	459.9930	917.6840	749.8365	934.1522	-29.6603	-29.4272
HW	984.2643	1814.2805	1111.9436	1519.2761	-29.6603	24.8403
ARIMA	455.2227	920.7802	19195.1458	20264.0526	-30.0224	1.9860
Prophet	2988.5762	4252.7395	20860.0738	21993.9635	-30.0224	-13.8101

● 比特幣歷史資料去除前兩年(測試集=10%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>325.7061</b>	<b>461.8139</b>	1154.5675	1462.9379	49.1671	14.4751
SVM	473.9315	918.9813	<b>417.1298</b>	<b>598.7634</b>	49.1671	-26.1085
RF	478.3779	915.1068	466.9845	640.7243	49.1671	-25.0259
HW	1015.4550	1804.7670	965.4660	1275.7009	49.1671	-0.3421
ARIMA	470.7024	917.8075	8184.3856	9297.3885	50.0854	3.0684
Prophet	3248.2623	4469.6431	18964.3080	22299.1754	50.0854	-54.5875

● 比特幣歷史資料去除前兩年(測試集=7)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>316.0384</b>	<b>449.5560</b>	<b>162.7401</b>	<b>221.9851</b>	59.2500	113.8724
SVM	464.6195	893.0523	172.2085	259.1532	59.2500	67.7220
RF	466.3863	888.7746	176.8809	261.0616	59.2500	113.9629
HW	1011.4618	1760.0990	619.1845	738.4078	59.2500	137.9043

ARIMA	462.7511	890.2117	228.8358	293.9487	59.2500	-91.6634
Prophet	3973.1855	5347.9099	10765.1355	10768.8396	59.2500	-137.9043

● 比特幣歷史資料去除前四年(測試集=30%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>363.8530</b>	<b>530.4038</b>	7349.1592	7962.2961	-16.7944	2.2211
SVM	587.8500	1097.8551	<b>822.4535</b>	<b>1022.7547</b>	-16.7944	-24.6592
RF	596.5676	1088.8634	844.3521	1058.4416	-16.7944	-24.0245
HW	1276.8101	2180.1914	1200.0582	1656.0368	-16.7944	20.5525
ARIMA	593.2303	1113.2386	13089.3220	14422.1116	-14.2910	-14.8841
Prophet	3263.4717	4213.8655	27304.2607	28730.7826	-14.2910	36.7465

● 比特幣歷史資料去除前四年(測試集=20%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>377.1698</b>	<b>535.6765</b>	1705.6093	2197.4185	17.4142	5.9425
SVM	617.3041	1107.4037	<b>506.2214</b>	<b>694.7119</b>	17.4142	-9.1893
RF	625.5768	1101.3973	769.6357	996.3484	17.4142	-3.0056
HW	1334.1691	2191.1968	940.7383	1245.6954	17.4142	8.3486
ARIMA	621.2062	1119.9366	4265.6570	4771.1281	24.0226	9.5865
Prophet	2276.6193	2906.8701	27912.5603	33176.1195	24.0226	-7.5644

● 比特幣歷史資料去除前四年(測試集=10%)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>363.7260</b>	<b>521.5083</b>	1354.5580	1617.7870	42.8174	18.6534
SVM	587.4012	1060.3533	<b>495.7383</b>	<b>669.7878</b>	42.8174	-23.5622
RF	592.6256	1055.5321	690.6409	852.5735	42.8174	-40.2788
HW	1273.4706	2093.5124	1075.6218	1394.6989	42.8174	-31.2021
ARIMA	590.4307	1071.9694	5838.4346	6295.7907	40.7276	17.9969
Prophet	2391.3731	3148.3133	17139.3132	19127.4340	40.7276	53.2821

● 比特幣歷史資料去除前四年(測試集=7)

基礎模型	訓練集		測試集		實際收益	預期收益
	MAE	RMSE	MAE	RMSE		
LR	<b>346.8168</b>	<b>493.3013</b>	195.3610	243.8312	59.2500	67.7220
SVM	572.9972	1027.7055	<b>166.0129</b>	<b>239.2898</b>	59.2500	67.7220
RF	576.6509	1023.8132	166.1067	259.3265	59.2500	67.7220
HW	1255.6469	2036.1991	619.1845	738.4078	59.2500	137.9043

ARIMA	575.9716	1037.6511	229.0523	294.7772	59.2500	-91.6634
Prophet	2026.5089	2717.0845	2301.3280	2311.5153	59.2500	59.2500