alamSYS: Development of Stock Market Price Forecasting System Using Dynamic Mode Decomposition, Long Short-Term Memory with Arnaud Legoux Moving Average Convergence-Divergence Integration

A Special Problem

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1.2 DMD-LSTM Model Results and Discussions

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Table 1.1: DMD-LSTM Training Error Metrics Scores
for Different Window Sizes

Error Metrics	Window Sizes			
	5	10	15	20
MSE	0.000037	0.787877	0.006917	0.057851
RMSE	0.006106	0.887624	0.083166	0.240522
MAE	0.004175	0.755407	0.067645	0.202746
MAPE	0.000001	0.000194	0.000017	0.000053

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Table 1.2: Baseline LSTM Training Error Metrics Scores
for Different Window Sizes

Error Metrics	Window Sizes			
	5	10	15	20
MSE	2912.840703	191.935882	1118.183283	706.136814
RMSE	53.970739	13.854093	33.439248	26.573235
MAE	35.301888	9.480864	22.099720	18.285352
MAPE	0.009618	0.002527	0.006024	0.005004

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Table 1.3: DMD-LSTM Cross-Validation Error Metrics Scores

Stocks	MSE	RMSE	MAE	MAPE
PSEI	0.00002	0.00419	0.00328	1.510000e-03
AC	0.00236	0.04856	0.03414	6.110000e-03
ALI	0.00255	0.05054	0.03645	1.597000e-02
AP	0.00129	0.03596	0.02515	9.220000e-03
BDO	0.00160	0.03999	0.02799	7.250000e-03
BLOOM	0.01883	0.13721	0.06901	1.052898e+12
FGEN	0.00224	0.04733	0.03265	1.197000e-02
GLO	0.00211	0.04595	0.03149	4.680000e-03
ICT	0.00335	0.05785	0.03731	3.005818e+11
JGS	0.00331	0.05752	0.03992	2.009923e+11
LTG	0.01567	0.12518	0.05858	3.583335e+12
MEG	0.00431	0.06565	0.04422	1.393042e+11
MER	0.00326	0.05708	0.03770	9.170000e-03
MPI	0.00273	0.05230	0.03390	2.497000e-02
PGOLD	0.00149	0.03865	0.02818	7.880000e-03
RLC	0.00338	0.05817	0.03978	6.922000e-02
RRHI	0.00131	0.03618	0.02699	6.390000e-03
SMC	0.00137	0.03702	0.02317	5.690000e-03
TEL	0.00178	0.04214	0.03002	4.240000e-03
URC	0.00297	0.05447	0.03742	1.798000e-02

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Table 1.4: DMD-LSTM Successive Predictions

Successive Days Predicted	Actual and Predicted Data Ratio	MAPE Score
1	100%	0.00973
2	80%	0.13403
3	60%	0.15782
4	40%	0.15646
5	20%	0.13910

Table 1.4 continued from previous page

Successive Days Predicted	Actual and Predicted Data Ratio	MAPE Score
6	0%	0.12494
7	-20%	0.11283
8	-40%	0.10014
9	-60%	0.08914
10	-100%	0.08976

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1.3   ALMACD Results and Discussions

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Table 1.5: Optimal Alma Parameters Validation Results

Stock	Compounded Expected Return
PSEI	113966.8500
AC	20893.1914
ALI	1072.1418
AP	690.7100
BDO	2541.9970
BLOOM	495.4600
FGEN	581.0804
GLO	60538.0035
ICT	2815.6103
JGS	1569.8650
LTG	397.2854
MEG	149.2233
MER	8586.0306
MPI	146.0200
PGOLD	721.2700

Table 1.5 continued from previous page

Stock	Compounded Expected Return
RLC	649.4767
RRHI	1050.7000
SMC	2557.0770
TEL	72070.5000
URC	3207.5394

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1.4 alamSYS System Tests Results and Discussions

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Table 1.6: Idle System Average Resource Usage Statistics

	alamAPI	alamDB	alamPREPROCESSOR
CPU Utilization (%)	0.168125	0.254313	0.009769
Memory Utilization (MiB)	45.718311	166.775377	312.798300

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Table 1.7: Internal Load Average Resource Usage Statistics

	Data Collector	Data Processor	alamSYS PREPROCESSOR (Data Collector & Data Processor)
Failure Rate (%)	0	0	0
Success Rate (%)	100	100	100
Average Runtime (s)	41.72398	8.38061	48.30466
Average CPU Utilization (%)	11.40659	92.71117	20.03138
Average Memory Utilization (MiB)	3.64200	57.09545	794.29436
Average Network Utilization (Mb)	232.73640	154	77.27655

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Table 1.8: Deployment Load Test Results (Buy Requests)

	Number or Requests		
	10	**100**	**1000**
Success Rate (%)	100	100	100
Average Processing Time (s)	11.905222	139.618550	1159.773569

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Table 1.9: Deployment Load Test Results (Sell Requests)

	Number or Requests		
	10	**100**	**1000**
Success Rate (%)	100	100	100
Average Processing Time (s)	13.384126	130.119867	1642.995011

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1.5 Results and Discussions for the Real World Application of alamSYS

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Table 1.10: Return Performance Comparison Between alamSYS and PSEI

	Realized Profit (PHP)	**Realized Gain (%)**
alamSYS	7,839.75	1.51
PSEI	-22,788.90	-13.810

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Chapter 2

Conclusions and Future Work

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References