CHAPTER 5
RESULTS AND ANALYSIS

5.1. Results

Following numerous training sessions with varying distributions of training data, the researcher acquired some assessment data, which will be discussed in the following step. Results of BAC can be seen on Table 5.1, results of HDB can be seen on Table 5.2, results of CNN can be seen on Table 5.3.

Table 5.1. Results of BAC

Testing		Models				
		Linear Regression	Lasso Regression	LSSVM	LSTM	CNN
2:8	MAE	4,424	4,519	3,738	4,901	3,744
	RMSE	5,540	5,765	5,840	6,377	4,866
	MAPE	15,234	15,450	13,341	16,511	13,146
4:6	MAE	4,243	4,452	3,390	5,638	3,378
	RMSE	5,323	5,612	4,935	6,531	4,549
	MAPE	15,255	15,889	12,279	20,461	11,954
5:5	MAE	4,165	4,369	3,417	4,483	3,617
	RMSE	5,290	5,558	4,900	6,128	4,864
	MAPE	14,942	15,556	12,351	14,997	12,578
6:4	MAE	4,155	4,344	3,405	3,399	3,390
	RMSE	5,252	5,470	4,927	4,765	4,623
	MAPE	14,981	15,534	12,396	11,077	11,661
8:2	MAE	3,887	4,134	3,300	3,288	3,063
	RMSE	4,973	5,227	4,526	4,414	4,238
	MAPE	14,331	15,147	12,165	11,872	11,166

Table 5.2. Results of HDB

Testing		Models				
		Linear Regression	Lasso Regression	LSSVM	LSTM	CNN
2:8	MAE	7,488	8,372	7,662	7,499	7,203
	RMSE	10,084	10,594	10,691	9,950	9,838
	MAPE	13,395	14,894	13,662	13,182	12,713
4:6	MAE	7,532	8,115	7,608	7,535	7,732
	RMSE	9,954	10,335	10,080	9,842	9,836
	MAPE	13,955	15,034	14,016	13,838	14,594
5:5	MAE	7,472	8,080	7,585	7,924	7,095
	RMSE	9,970	10,400	10,280	9,968	9,666
	MAPE	13,766	14,849	13,967	15,229	12,480
6:4	MAE	7,513	8,083	7,478	7,389	7,537

	RMSE	10,039	10,408	10,000	9,720	9,622
	MAPE	13,805	14,750	13,731	13,454	14,113
8:2	**MAE**	7,180	7,838	7,252	6,595	6,751
	RMSE	9,700	10,137	9,498	8,865	9,002
	MAPE	13,195	14,450	13,407	11,810	12,271

Table 5.3. Results of RY

Testing		**Models**				
		Linear Regression	**Lasso Regression**	**LSSVM**	**LSTM**	**CNN**
2:8	**MAE**	7,269	8,517	5,332	8,737	5,131
	RMSE	9,541	10,946	7,435	12,230	7,139
	MAPE	9,950	11,507	7,488	11,316	7,209
4:6	**MAE**	6,960	8,120	5,310	5,474	6,097
	RMSE	9,047	10,093	7,489	7,687	8,383
	MAPE	9,891	11,402	7,658	7,849	8,832
5:5	**MAE**	6,841	7,884	5,168	5,956	4,567
	RMSE	8,985	9,926	7,208	8,269	6,652
	MAPE	9,648	11,021	7,407	8,054	6,395
6:4	**MAE**	6,898	7,892	5,170	6,412	4,614
	RMSE	9,016	9,912	7,064	8,366	6,680
	MAPE	9,764	11,066	7,409	9,187	6,542
8:2	**MAE**	6,422	7,541	4,765	4,476	4,093
	RMSE	8,458	9,355	6,333	6,025	5,584
	MAPE	9,183	10,766	6,909	6,618	5,993

5.2. Analysis

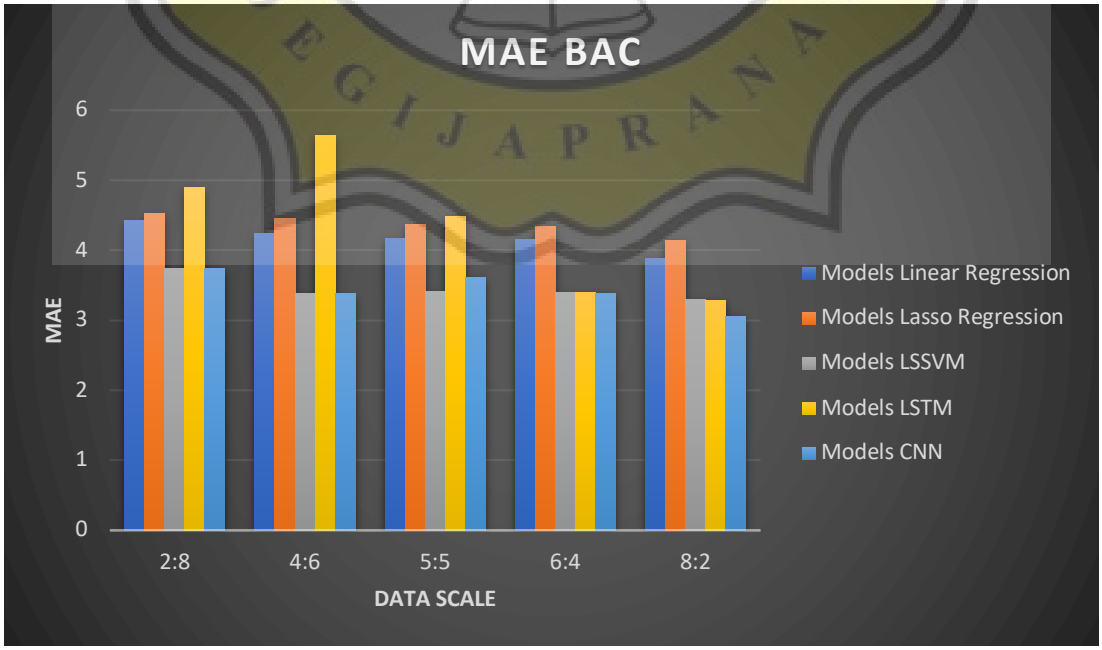

Figure 5.1 Mean Absolute Error of BAC

Figure 5.1 depicts the BAC dataset's Mean Absolute Error statistics. We can see from the graph above that the majority of CNN models have lower error levels. However, the error levels of the LSSVM and CNN models are essentially the same under some scenarios, such as the 2:8 scale. Overall, we may conclude that the CNN model is more successful than other models in this case.

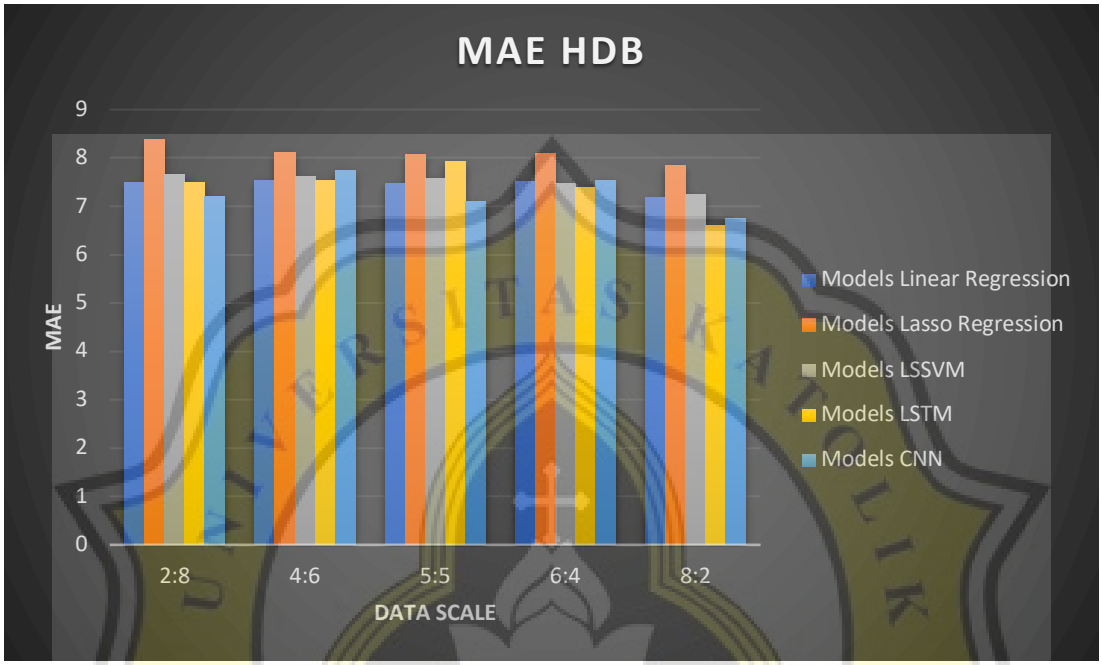

Figure 5.2 Mean Absolute Error of HDB

The Mean Absolute Error data from the HDB dataset is shown in Figure 5.2. According to the graph above, the error levels of the Linear Regression and LSTM models are about the same under certain parameters, such as the 4:6 scale. Also, we can see from the graph that the LSTM and CNN models have about the same error numbers, but when we look at it again, the LSTM model is more effective than the CNN model.

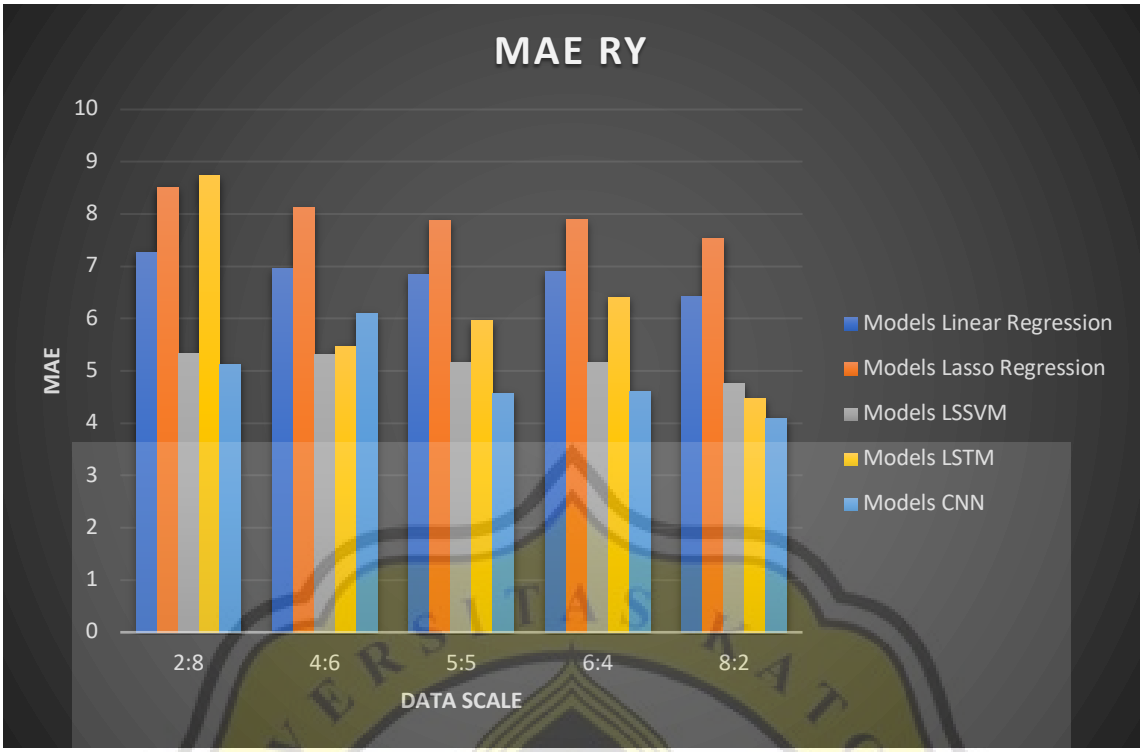

Figure 5.3 Mean Absolute Error of RY

The Mean Absolute Error data from the RY dataset is shown in Figure 5.3. According to the graph above, the CNN model has a reduced error value for forecasting at all data sizes. Overall, we may conclude that the CNN model is more effective than the other models.

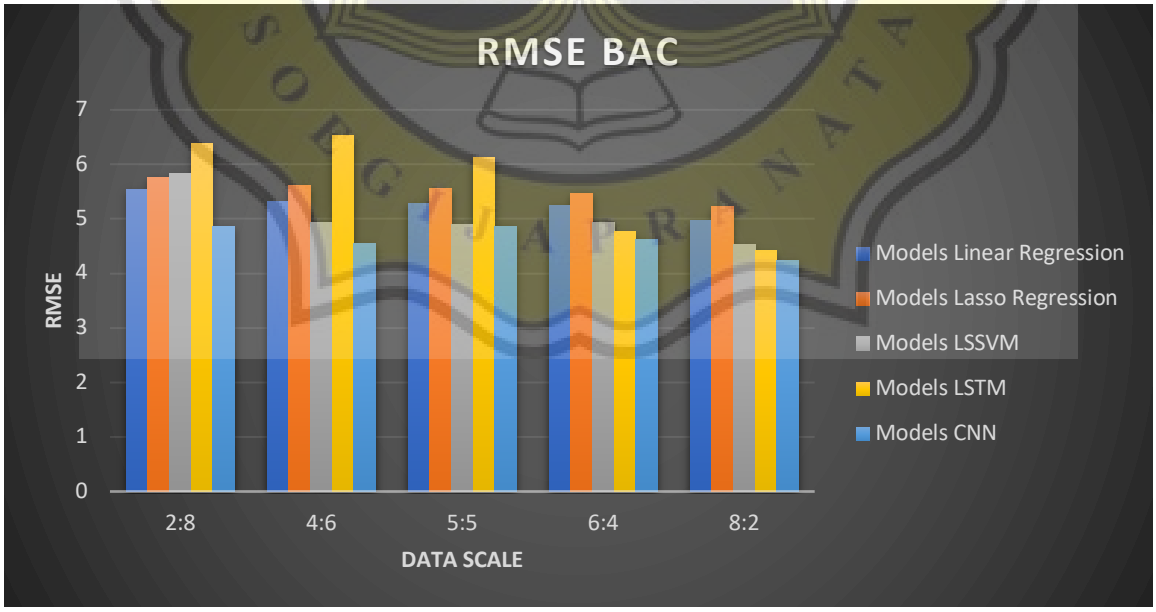

Figure 5.4 Root Mean Squared Error of BAC

The Root Mean Squared Error data from the BAC dataset is shown in Figure 5.4. According to the graph above, the CNN model has a reduced error value for forecasting at all data sizes. Overall, we may conclude that the CNN model is more effective than the other models.

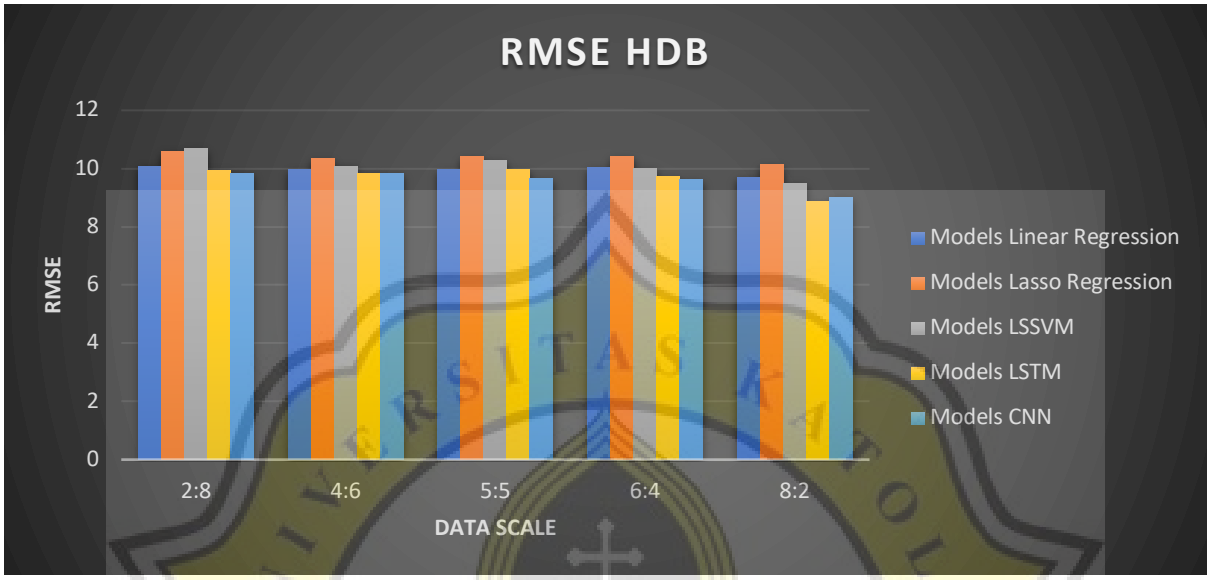

Figure 5.5 Root Mean Squared Error of HDB

Figure 5.5 depicts the HDB dataset's Root Mean Squared Error statistics. We can see from the graph above that the majority of CNN models have lower error levels. However, the error levels of the LSTM and CNN models are essentially the same under some scenarios, such as the 4:6 scale. Overall, we may conclude that the CNN model is more successful than other models in this case.

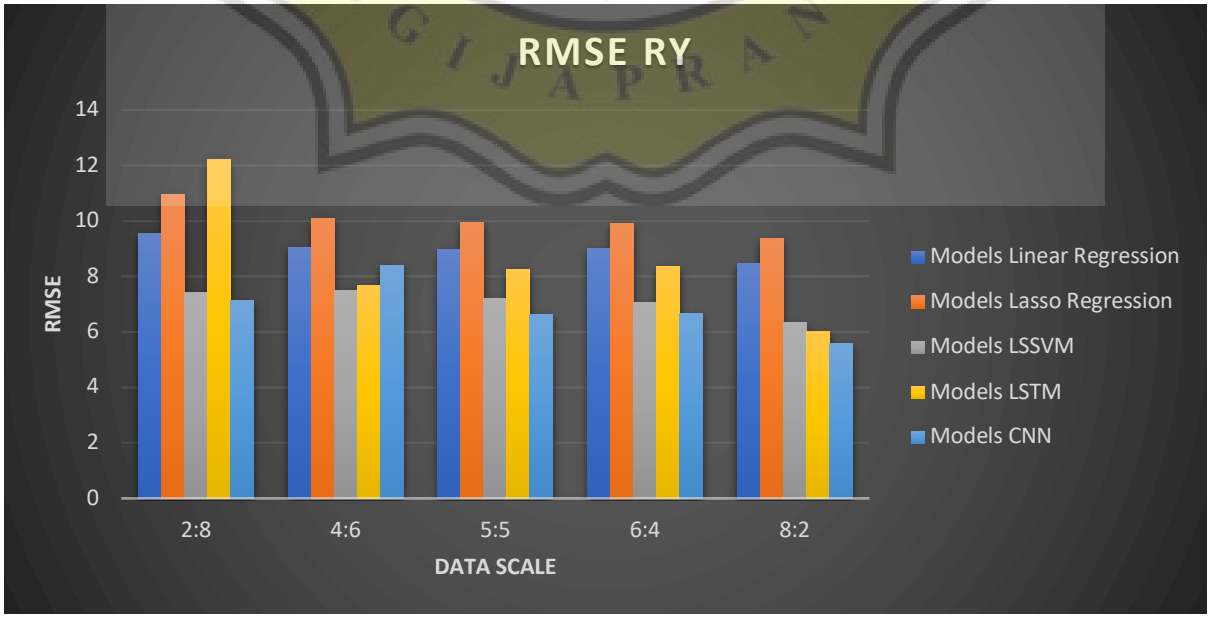

Figure 5.6 Root Mean Squared Error of RY

The Root Mean Squared Error data from the RY dataset is shown in Figure 5.6. According to the graph above, the CNN model has a reduced error value for forecasting at all data sizes. Overall, we may conclude that the CNN model is more effective than the other models.

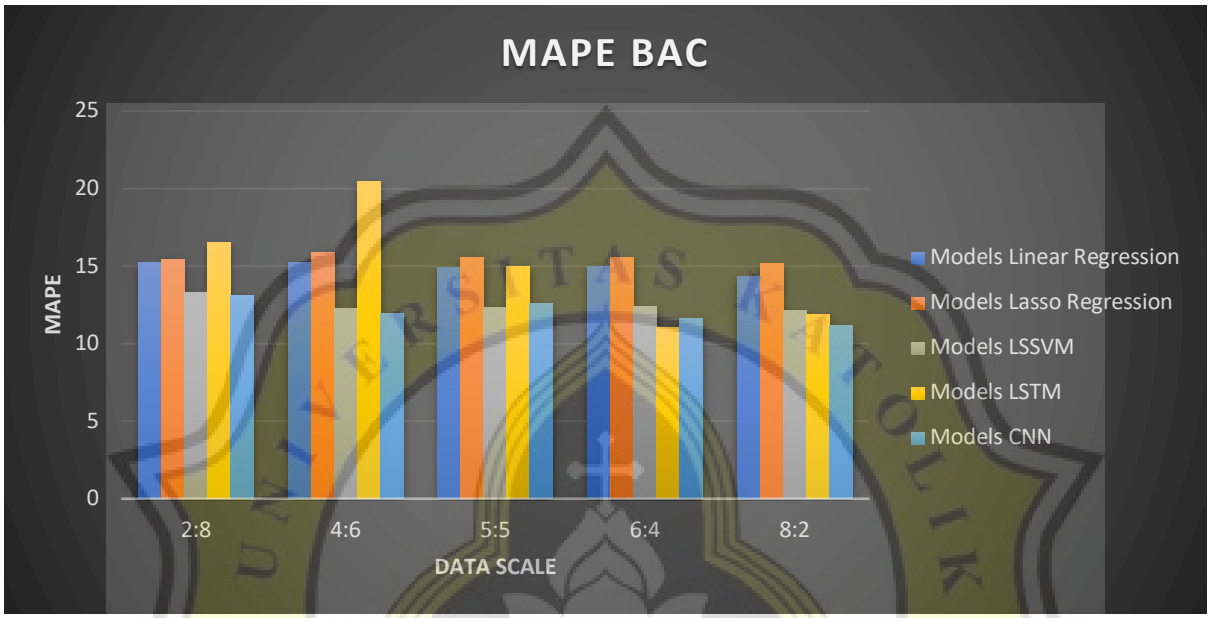

Figure 5.7 Mean Absolute Percentage Error of BAC

The Mean Absolute Percentage Error data from the BAC dataset is shown in Figure 5.7. Based on the graph above, at a 5:5 data scale, the LSSVM and CNN models have almost the same error values. However, the majority CNN model has a lower error value so that the CNN model is more effective in forecasting.

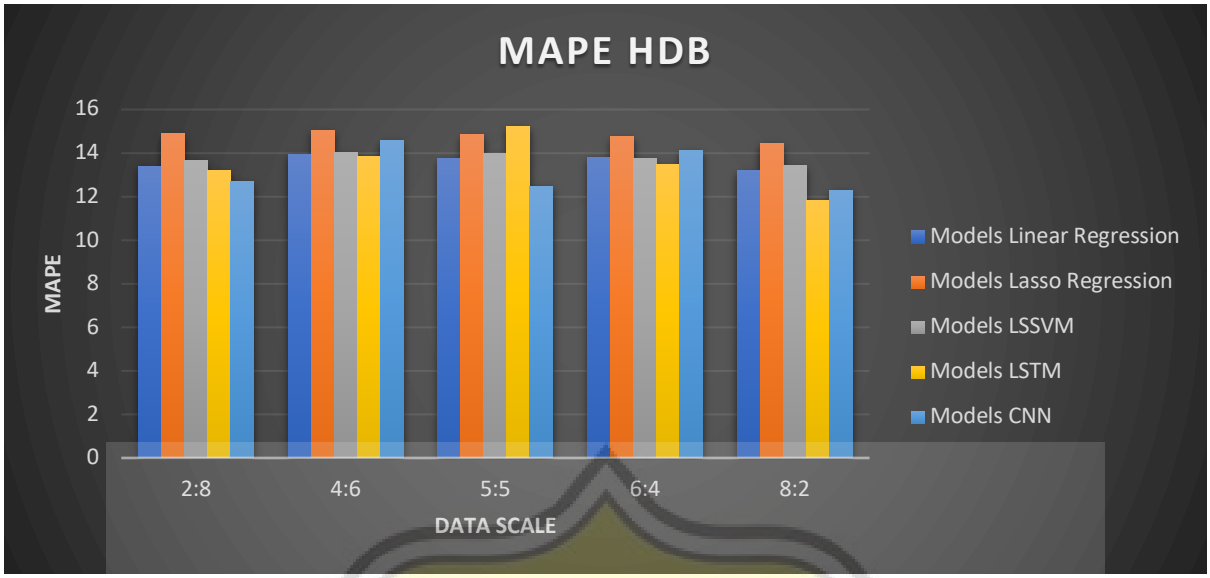

Figure 5.8 Mean Absolute Percentage Error of HDB

The Mean Absolute Percentage Error data from the HDB dataset is shown in Figure 5.8. Based on the graph above, at a 4:6 data scale, the Linear Regression and LSTM models have almost the same error values. However, the majority LSTM model has a lower error value so that the LSTM model is more effective in forecasting.

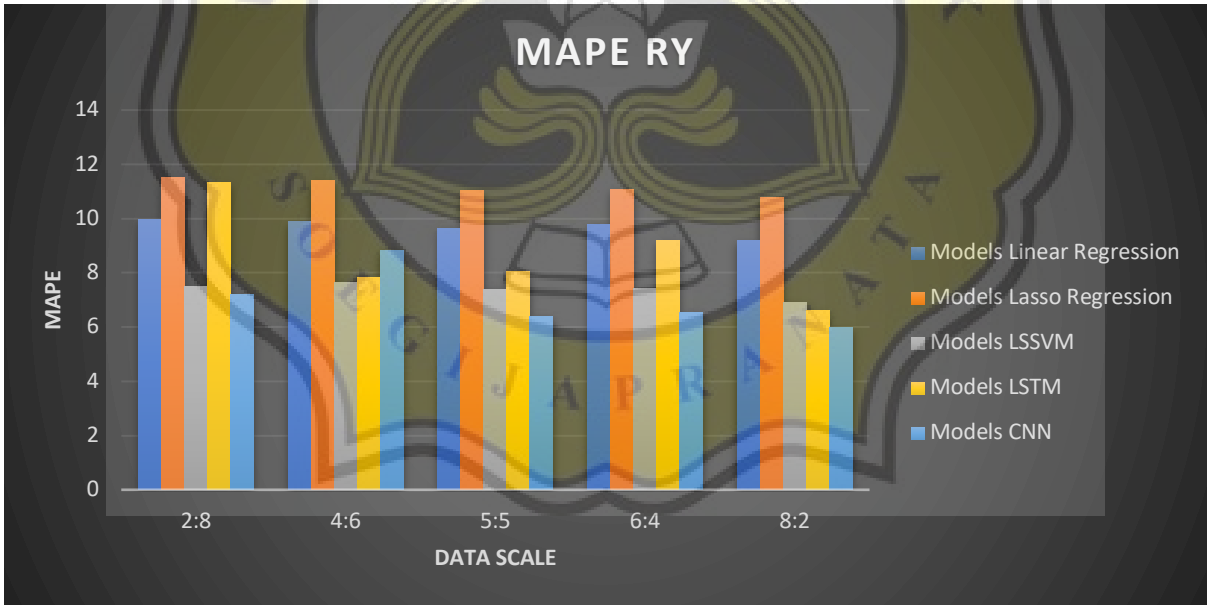

Figure 5.9 Mean Absolute Percentage Error of RY

The Mean Absolute Percentage Error data from the RY dataset is shown in Figure 5.9. Based on the graph above, at a 4:6 data scale, the LSSVM and LSTM models have almost the same error values. However, the majority CNN model has a lower error value so that the CNN model is more effective in forecasting.