



Comparing Model Of Air Pollution Index Using Generalized Autoregressive Conditional Heteroskedasticity Family (Garch)

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Introduction



- 1. In environmental study, the interpretation of time series models for Air Pollution Indexs (API) include:
- -separation (or filtering) of noise from signals
- -prediction of future values of a series or the population data
- 2. Time series forecasting is vital in the study of environmental issues in which because it is lead will effect the health of people.



Objectives



- 1. To develop univariate API model using INGARCH (1,1), NBINGARCH (1,1) and INARCH (1,0) model.
- 2. To compare the best model using AIC and BIC for integer value data.



Literiture Review



Author	Comparison Model Method	Data Specification
Wang and Lu (2006), Ibrahim, et al. (2009), Kurt and Oktay(2010).	· ARIMA	Multivariate and Continues data
Rahman, Hisyam Lee, Talib Latif (2014).	· ARIMA, ANN, FTS	 Univariates and Integer Values of yearly data.
Hong Zhenf , et al. (2017)	 Hybrid-Garch, ARIMA, SVM(Support Vector Machine). 	Multivariate and Continues data
Suling Zhu , et al. (2017)	• S-ARIMA (seasonal ARIMA)	Multivariate and daily Continues data
H. Maleki , et al. (2019)	· ANN	Multivariate and Continues data
Current (2021)	· INGARCH, NBINGARCH, INARCH	 Univariates and Integer Values of daily data



Methadology



Fitted GARCH family model

Using augmented dickey fuler (ADF) test to find the best order for the model.

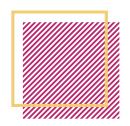
Using Lagrange multiplier (LM) to test for the volatility.

Comparing Model

INGARCH (1,1)

NBINGARCH (1,1)

INARCH (1,0)



Data Description



- 1. Retrieving from open source data of Statistic Department Malaysia. (Department of Statistics Malaysia, 2019)
- 2. Collecting daily data in January 2019 until June 2019 for Air Pollution Index.
- 3. The data collect for Sarawak and Peneng.

Location	Number of Location		
Sarawak	6		
Peneng	2		
TOTAL	8		

Table 1: Summary data location collected for Air Pollution Index.



Results and Discussions



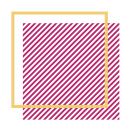
LOCATION	PARAMETER	MODEL		
		INGARCH(1,1)	NBINGARCH (1,1)	INARCH (1,0)
Limbang	α	0.0003	0.0003	-
	β	0.7140	0.7140	0.7210
	AIC	1399.0710	1243.7300	1397.1000
	BIC	1408.6300	1256.4800	1403.4750
Samarahan	α	0.3000	0.3000	-
	β	0.5000	0.5000	0.6400
	AIC	1286.3800	<mark>1251.5800</mark>	1292.4600
	BIC	1295.9400	1264.3300	1298.8300
Kimanis	α	0.0002	0.0002	-
	β	0.8900	0.8900	0.8800
	AIC	1252.21	<mark>1243.73</mark>	1250.8800
	BIC	1261.77	1256.48	1257.2600







- 1. From the result, showed that INARCH (1,1) model for Seberang Perai, Balik Pulau, ILP Miri and Bintulu has the lowest AIC and BIC.
- 2. Besides, NBINGARCH (1,1) model has the lowest AIC and BIC for Limbang, Kapit, Kimanis and Samarahan.
- 3. Its show that NBINGARCH (1,1) and INARCH (1,0) model outperformed INGARCH (1,1) model.



Conclusion



- 1. NBINGARCH (1,1) and INARCH (1,0) model was capable of treating modelling for index values of API.
- 2. NBINGARCH (1,1) and INARCH (1,0) proved to be a flexible and intelligent comparison method that is a useful and effective tool for GARCH family model using integer value.





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