# ABSTRACT

---


**PROJECT CODE** : TRG5780219

**PROJECT TITLE** : Model Selection Criterion to Overcome the Weak Signal-to-Noise Ratio and to Reduce the Probability of Over/ Underfitting

**INVESTIGATOR** : Asst.Prof.Dr. Warangkhana Keerativibool
Thaksin University, Phatthalung Campus

**E-MAIL ADDRESS** : warang27@gmail.com



**PROJECT PERIOD** : June 15, 2014 – June 14, 2016


**ABSTRACT** :


This research proposed a model selection criterion in order to overcome the weak signal-to-noise ratio and to reduce the probability of over/underfitting by adjusting the penalty term of the well-known model selection criteria *(AIC*, *BIC*, *KIC*), called adjusted penalty information criterion, $APIC = \log\left(\hat{\sigma}^2\right) + \alpha\left(p+1\right)/n$. Criterion is classified to be the best when it has the strong signal-to-noise ratio, lowest probability of over/underfitting and maximum probability of correct order being selected. The theoretical results show that, if the value of $\alpha$ tends to infinity, the probability of overfitting tends to zero and the signal-to-noise ratio tends to strong, but the probability of underfitting tends to one. The simulation results show that, when the true model is difficult to identify, distributions of independent variables are normal or uniform, the appropriate $\alpha$ is small. But for the independent variables are normal distributed, sample size increases and variances of error terms are small to moderate, $\alpha$ should be moderate. If the true model is easily to identify, distribution of independent variables is normal and variances of error terms are small to moderate, the appropriate $\alpha$ is large. When the variance of error terms increases, $\alpha$ should be moderate. If the distribution of independent variables changes to be uniform and variances of error terms are small to moderate, $\alpha$ should be moderate, otherwise $\alpha$

should be small. If the variance of error terms increases, the validity of *APIC* decreases, but when the sample size increases, the validity of *APIC* also increases.

**Keywords:** Kullback's directed divergence, Kullback's symmetric divergence, model selection.