

Parameter Estimation of Additive Genetic and Unique Environment (AE) Model on Diabetes Mellitus Type 2 Using Bayesian Method

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Abstract : Diabetes mellitus (DM) is a chronic disease in human that occurred if pancreas cannot produce enough of insulin hormone or the body uses ineffectively insulin hormone which causes increasing level of glucose in the blood, or it was called hyperglycemia. In Indonesia, DM is a serious disease on health because it can cause blindness, kidney disease, diabetic feet (gangrene), and stroke. The type of DM criteria can also be divided based on the main causes; they are DM type 1, type 2, and gestational. Diabetes type 1 or previously known as insulin-independent diabetes is due to a lack of production of insulin hormone. Diabetes type 2 or previously known as non-insulin dependent diabetes is due to ineffective use of insulin while gestational diabetes is a hyperglycemia that found during pregnancy. The most one type commonly found in patient is DM type 2. The main factors of this disease are genetic (A) and life style (E). Those disease with 2 factors can be constructed with additive genetic and unique environment (AE) model. In this article was discussed parameter estimation of AE model using Bayesian method and the inheritance character simulation on parent-offspring. On the AE model, there are response variable, predictor variables, and parameters were capable of representing the number of population on research. The population can be measured through a taken random sample. The response and predictor variables can be determined by sample while the parameters are unknown, so it was required to estimate the parameters based on the sample. Estimation of AE model parameters was obtained based on a joint posterior distribution. The simulation was conducted to get the value of genetic variance and life style variance. The results of simulation are 0.3600 for genetic variance and 0.0899 for life style variance. Therefore, the variance of genetic factor in DM type 2 is greater than life style.

Keywords : AE model, Bayesian method, diabetes mellitus type 2, genetic, life style

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