

ON COMPUTATIONAL BAYESIAN ORDINAL LOGISTIC REGRESSION LINK FUNCTION IN CASES OF CERVICAL CANCER IN TUBAN

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Introduction



Cervical cancer has the highest prevalence among women and ranked second to breast cancer as cause of death. In Indonesia, cervical cancer causes death in women. This disease is primarily caused by Human Papilloma Virus (HPV). Logistic regression with link function is a method to create a model by using dichotomous and polychotomous response variable. the data distribution in logistic regression are not always represented in clear distribution, thus this study investigates the link function of ordinal logistic regression using Bayesian MCMC computational.

Abstract

Cervical cancer is the most common cancer that causes death in women. This cancer is mainly caused by Human Papilloma Virus (HPV). To understand the predicting factors of the test results, a comprehensive mathematical modelling was created using the link function of Bayesian Ordinal Logistic Regression. The outcomes indicated that the predicting factors of Pap cervical cancer results are Age (X_1), Education (X_2), Childbirth Experience (X_3), Use of Contraceptives (X_4), Menstrual Cycle (X_5), and Anemia (X_8).

METHOD

This research uses secondary data of medical records of female patients undergoing Pap cervical cancer test at Koesoma Hospital, Tuban, in 2020. The variables are categorical. This research uses response and predictor variables. The response variable is female patients who underwent Pap test. The predictor consists of eight variables. This study observed several possible factors that may affect Pap test results in Tuban regency, namely Age (X_1), Education (X_2), Childbirth Experience (X_3), Use of Contraceptives (X_4), Menstrual Cycle (X_5), Age of First Menstruation (X_6), History of Miscarriage (X_7) and Anemia (X_8)

RESULT AND DISCUSSION

This shows that there is an inexplorable dependency in this link function of ordinal logistic regression model. This model is presented below:

$$g(1) = \ln \left[\frac{\pi(x)}{1 + \pi(x)} \right] = 35.546 + 0.0034x_1 - 0.0027x_2 + \dots + 0.0041x_9$$

$$g(2) = \ln \left[\frac{\pi(x)}{1 + \pi(x)} \right] = 52.631 + 0.0034x_1 - 0.0027x_2 + \dots + 0.0041x_9$$

The results of link function of ordinal logistic regression with Bayesian_MCMC method shows that the factors influencing the results of PAP cervical cancer test in Surabaya are Age (X_1), Childbirth Experience (X_3), Use of Contraceptives (X_4), Menstrual Cycle (X_5), Age of First Menstruation (X_6), and Anemia (X_8). This result differs from that of [1]'s study which applied Maximum Likelihood Estimation and suggested that the predicting factors of cervical cancer test results are the use of contraceptives, childbirth experience, menstrual cycle, and history of miscarriage. he link function of ordinal logistic regression model is able to yield some information beneficial to be featured in dissemination about cervical cancer management in Tuban Regency.

CONCLUSION

The link function of ordinal logistic regression model suggests that the predicting factors of Pap cervical cancer test results alpha values indicate that there is an error dependency that cannot be explained through this model. The link function of ordinal logistic regression model with Bayesian-MCMC method is able to elaborate any complexity and handle Gauss-Markov assumptions violation.

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