

非齊性馬可夫長期二元資料的分析

研究生： 李冠達

指導教授： 彭南夫 博士

國立交通大學統計學研究所

摘要

在長期資料的研究中，二元出象的分析一直以來都是重要的統計議題，這篇論文介紹一個新的遞移模型，假設在 t 時間點，觀察到的是 $Y(t)$ ，其現象為 $1/0$ ，但是 $Y(t)$ 完全被一個不可觀測到且隱藏的隨機變數 $N(t)$ 所決定， $N(t)$ 服從卜瓦松過程，其密度函數為 λ ，而共變因子 x_1, x_2, \dots 經由對數線性函數決定 λ ，影響整個 $Y(t)$ 的過程，主要目標就是找出這些共變因子係數的最大概似估計量。

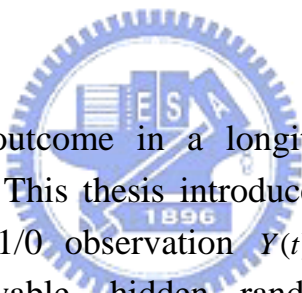
我們用二狀態非齊性連續時間馬可夫鍊的轉移機率來建構新的遞移模型，當將簡單的模型擴展到複雜的模型，例如 $N(t)$ 服從非齊性不瓦松過程，同時，可以從齊一性連續時間馬可夫鍊延伸到非齊性連續時間馬可夫鍊。新的遞移模型具有相當大的彈性，可以很容易地將與時間獨立或有關的因素考慮進來，包含離散或連續類型。

Analysis of Nonhomogeneous Markov Longitudinal Binary Outcome Data

Student : Cwan-Da Li Advisor : Dr. Nan-Fu Peng

Institute of Statistic
National Chiao Tung University

ABSTRACT



Analysis of binary outcome in a longitudinal study has been an important statistical issue. This thesis introduces a new transitional model which assumes that the 1/0 observation $Y(t)$ at time t is completely decided by an unobservable, hidden random variable $N(t)$ via a many-to-two transformation, where $N(t)$ follows a Poisson process with intensity parameter λ . Covariates x_1, x_2, \dots are included into the process via the log-linear function as arguments for λ . The major goal is to find the MLE's of the coefficient of covariates.

We use the transitional probability of two states nonhomogeneous continuous time Markov chain to build the novel transitional model. When we extend the simple model to more complicated ones such as nonhomogeneous Poisson process, we can extend the homogeneous continuous time Markov chain to nonhomogeneous one at the same time. The novel transitional model is very flexible. It can easily incorporate time-independent and time-dependent covariates of both discrete and continuous forms.