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EM algorithm for the Stochastic Frontier Model

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Abstract

A stochastic frontier model in a panel data is written as

$$y_{it} = \beta_0 + x_{it}\beta + v_{it} - \mu_i \qquad i = 1,...N; \quad t = 1,...,T$$

$$\varepsilon_{it} \equiv v_{it} - \mu_i$$

Where y_{it} is the logarithm of the output of the *i*th firm and tth time periods, x_{it} is a vector of input. The efficiency component ($\mu_i \geq 0$) is a one-sided, non-negative error, derived from a half-normal distribution. Technical inefficiency exists to the extent that a firm's output lies beneath the frontier. The stochastic component v_{it} is an unobservable random variable (a statistical noise). The model assume the following：

$$v_{it} \sim N(0, \sigma^2)$$

$$\mu_i \sim N^+(0, \sigma_\mu^2)$$

There are several estimation techniques procedures about construction of confidence intervals of the individual producer's inefficiency μ_i

1) JLMS and MC method

2) MCB method

In this paper, we consider the application of the EM algorithm for ML estimation of the parameters μ_{it}^* and σ_*^2.

Key words: A stochastic frontier model，EM algorithm， confidence intervals，monotone decreasing \ increasing function

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