Lamperti Optimization

Renzo Miguel Caballero Rosas

April 5, 2020

Description:

Let $\{\Delta V_i\}_{i=1}^n$ be the set of all error transitions, and $\psi(\theta_0, \alpha, \Delta V)$ the Lamperti transform. Notice that the Lamperti transitions $\{\Delta Z_i\}_{i=1}^n$ depend on (θ_0, α) because

$$\{\Delta Z_i\}_{i=1}^n = \psi(\theta_0, \alpha, \{\Delta V_i\}_{i=1}^n).$$

Then, if we compute

$$\max_{(\theta_0,\alpha)} \mathbf{L}(\theta_0, \alpha, \{\Delta Z_i\}_{i=1}^n),$$

we are NOT computing a MLE in the classical sense. However, we can try to find a fixed point (θ_0^*, α^*) such that

$$(\theta_0^*, \alpha^*) = \arg\max_{(\theta_0,\alpha)} \mathbf{L}\left(\theta_0, \alpha, \psi(\theta_0^*, \alpha^*, \{\Delta V_i\}_{i=1}^n)\right).$$

In this point, the likelihood has a maximum for the data set corresponding to that point.