Balancing Input-Output tables with Bayesian Slave-raiding Ants

Rolando Gonzales Martínez
Economist, Analysis Unit of Social and Economic Policy (Ministry of Development Planning),
La Paz – Bolivia.

Abstract. Input-Output (I-O) tables are produced by statistical offices to estimate the relationships between the sectors of an economy. I-O tables can be unbalanced if the sum of its columns (total input destination) does not equal the sum of its rows (total output). An artificial Ant Colony (ACO) algorithm based on Bayesian slave-making polymorphus ants is proposed for balancing an I-O matrix. The approach is inspired on the behavior of *Rossomyrmex minuchae*, a parasite ant that enslaves other species of ants (*Proformica*) which in turn choose an optimal path between their colony and the source of food by leaving a trace of pheromones. In the algorithm, an improvement in the balance of I-O accounts increase the pheromones, thus raising the probability of ants moving towards the equilibrium of the matrix. An application to a real I-O matrix and Monte Carlo experiments were performed to evaluate the proposed ACO algorithm. The results showed that slave-raiding ACO can be used by statistical offices as an automated algorithm to produce more timely and reliable I-O tables.