

## POPULATION BASED TECHNIQUES

In these techniques, an evolutionary mechanism is used to transform a population (set) of solutions from one generation to the next in order to lead the search into promising regions of the feasible domain. The most well known population based technique is the **genetic algorithm** that mimics biological mechanisms based on selection and natural evolution principles. A *crossover (reproduction)* operator is used to generate offspring solutions inheriting the better components of parent solutions. The approach is introduced and illustrated with different examples: assignment type problem, graph coloring problem, resource constrained project scheduling problem.

The **ant colony algorithm** is another evolutionary process that mimics the behaviour of ant colonies in their quest for food. The ants are guided by pheromone traces left by other members of the colony who found good sources of food before. The algorithm is illustrated with the assignment type problem.

The **particle swarm** algorithm mimics a swarm of birds moving to reach some destination point. The position of each bird at the next instant depends of its current position and that of the leader of the swarm. This evolutionary process is illustrated with an application related to open pit mining.