Ant algorithms were .rst proposed by Dorigo and colleagues [33, 40] as a multi-agent

approach to dif.cult combinatorial optimization problems such as the traveling salesman

problem (TSP) and the quadratic assignment problem (QAP). There is currently

much ongoing activity in the scienti.c community to extend and apply ant-based algorithms

to many different discrete optimization problems [5, 21]. Recent applications

cover problems such as vehicle routing, sequential ordering, graph coloring, routing in

communications networks, and so on.

Ant algoriths were first proposed as an approach to difficult combinatorial problems.

Such as the traveling salesman problem (TSP) and the quadratic assignment problem (QAP)