

DE MONFORT UNIVERSITY

ABSTRACT

FACULTY OF COMPUTING SCIENCES AND ENGINEERING

Doctor of Philosophy

AN AGENT-BASED FRAMEWORK FOR FOREST PLANNING

By

A.M. Rasol

Forest data is diverse and complex which makes forest planning a difficult task that requires sophisticated forestry models for AI systems and application-specific frameworks. In particular, the nature of conflicting objectives, multiple constraints and changing environments has made forestry software development an onerous task. This thesis presents the use of software agents, and their ability to react to new changes in the environment, with a view to develop an agent-based framework to support forest planning. Software agent technology is a field of research largely overlooked within the forestry community.

This framework is developed for designing and implementing multi agent systems for forest planning. These systems are getting a lot of attention within the field of forestry management information systems, as some researchers have argued that they are suitable for solving complex computer information systems in a feasible manner (Saarenmaa, et al. 1991). A practical and structured framework for designing and implementing these architectures is still lacking. The agent-based framework presented in this work provides such a framework and can be used to design and implement multi-level architecture. Furthermore, the architecture is open such that intelligent agents can be easily added, removed or changed. Conceptually, this framework provides a middleware component between the existing forestry models for AI systems and application-specific frameworks.

Three new forest planning systems have been developed throughout this agent-based framework. Each system consists of a set of agents that are combined by heterogeneous techniques. The mixture of these three systems emphasises the flexibility and functionality of the proposed agent-based framework for forest planning. Finally, a case study is given to illustrate the framework.