SVM-BASED KNOWLEDGE DISCOVERY IN COMBAT SYSTEMS*

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Abstract. In this paper, we provide an approach to investigate the nonlinearities of combat systems through High-Level Architecture (HLA) based simulations. We describe the design of a tactical combat system to support data farming and data mining. In order to explore the determining factors in warfare, we choose a mining algorithm of a Support Vector Machine (SVM) with specific kernels. We acquire a quantitative knowledge discovery model together with some conclusions.

Keywords. High Level Architecture, Combat System, Data Farming, Support Vector Machine, Knowledge Discovery.

AMS (MOS) subject classification:

1 Introduction

Understanding the nonlinearities and other intrinsic characteristics of warfare is crucial for military planners. However, traditional modelling and simulation techniques often fail to meet these challenges. In October 1995, Alfred G. Brandstein and Gary E. Horne embarked on the Marine Corps Project Albert, which uses a series of new models and tools, multidisciplinary teams, and the scientific method to explore the above questions. The meta-technique is called data farming, which concerns choosing the best part of data to be passed to data mining systems. Particularly, it can be divided into several processes, like fertilizing, cultivating, planting, and harvesting, etc [1][2]. And it requires high performance computing assets to run the Agent-based model in an iterative process and grow an overwhelming amount of data which helps to answer the questions at hand. Besides, it develops some visualization tools, which provides for rotation, zooming, selection, etc for exploring the massive simulation data.

Referring to the schemas of Project Albert, we design an HLA-based data farming and data mining system in Figure 1. To begin with, based upon the main ideas of data farming, we adopt HLA-based simulation models to grow the desired data which promises to solve the target questions. Towards the massive simulation data, we organize and restore them to relational databases