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Modelling and Meeting Simulation Model by V & V Method

S.Ezhilmathi[1]M.E, V.Shanmugapriya[2], S.Saroja[3], P.Renuga[4]

Assistant Professor, IT, Dr.NNCE, Tholudur, Tamilnadu[1]

B. Tech, IT, Dr.NNCE, Tholudur, Tamilnadu[2,3,4]

Abstract: The advancements in the information and communication (ICT) technologies have made it possible to test and verify any sort of system before deploying it into the real time environment. The verification and validation (V&V) tools and techniques have also helped in minimizing the risk of the project failure or application. In the recent year, it has been observed that the artificial intelligence and multi agent models have being gaining importance due to the high requirements for the automation of systems or environments. In this research paper, we have presented a system design approach for the verification and validation (V&V) of agent based model and software application. The proposed solution of the E-VOMAS approach is based on the system layered architecture. The E-VOMAS approach can be utilized for the verification and validation (V&V) of the agent based model and software engineering applications. The simulation has been tested using the agent based models. The multi agent meeting scheduling model has been utilized for the simulation and testing of the E-VOMAS Approach. To demonstrate the effectiveness of Multi agent meeting scheduling system and E-VOMAS approach, we will show its broad applicability in a wide variety of simulation models ranging from social sciences to computer networks in spatial and non-spatial conceptual models.

Keywords: Verification and validation (V&V), E-VOMAS, Agent-based Model, Information and communication (ICT), software engineering.

I. INTRODUCTION

In the modern world of information tools and technologies, the demand of the information system (IS) is increasing day by day. There are number of different organizations which are planning to migrate their solutions from traditional paper based environment to paper less environment. The paper less environment can only be possible with the integration of the advance information and communication network. The information system (IS) can help to automate number environmental processes which require lot of time if performed manually. However, deploying these Information systems in the real time is the critical challenge. If the proper verification and validation (V&V) is not performed, there is a high risk that these information systems (IS) and their applications are failed to achieve the required goals for the purpose these application are developed. In these days, number of information systems (IS) is equipped with agent based models to take the decision without involving the human. So these models and systems require a unified framework approach for the verification and validation (V&V).

The system is designed according to their specifications and requirements criteria which can only be evaluated with the help of the verification and validation (V&V). The verification and validation (V&V) are independent procedure and third party tools and techniques can be integrated for the verification and validation (V&V) of the systems, services, products and application.

The E-VOMAS approach is the extension of the VOMAS approach. The VOMAS approach is based on the

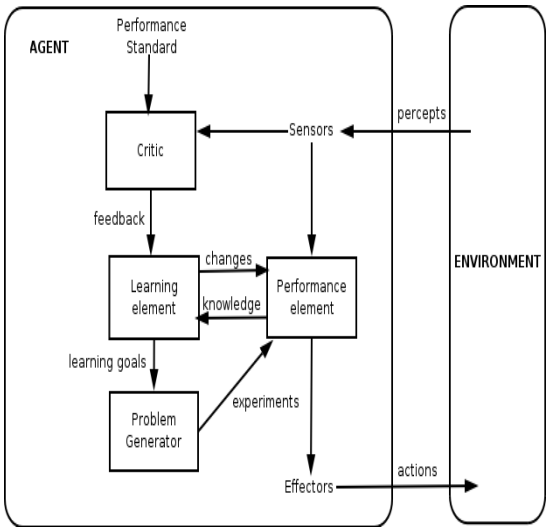

Fig. 1 Intelligent Learning Agents

Companion modeling that involves Subject Matter Experts (SME). However, we have integrated the E-VOMAS approach with number of software applications and decision support systems. The existing approach of the VOMAS was unable to integrate with the software application working in the context of decision support system (DDS).

RESEARCH OBJECTIVE

There are few research objectives which have been presented in the form of following points:

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1. The paper presents a conceptual framework for the verification and validation (V&V) of the agent based model or software engineering application the framework have been simulated on the open sources technology.
2. The performance evaluation of the proposed solution has been conducted on the agent based application. However, we will utilize the Multi agent meeting scheduling system for the simulation of the presented E-VOMAS approach.
3. The proposed architecture provides an extension of Virtual Overlay Multi-agent System approach. The proposed system architecture has been built on the overlay system architecture. The virtual overlay of the system contains number of agent which has different duties and activities to perform to exactly evaluate the application.
4. The proposed approach is the demonstration of the Multi Agent meeting scheduling system. The verification and validation (V&V) will be based on the accuracy of the resources which have been utilized by the meeting agents

2. SYSTEM ARCHITECTURE

The E-VOMAS system layered architecture has been utilized for the presentation of the E-VOMAS approach. Each specific functionality and process has been divided into different layers. The proposed system architecture can be linked as the third party components in the software application or agent based system. The MSF "Microsoft Solution Framework" has been utilized for planning and development of the whole concept of the proposed solution.

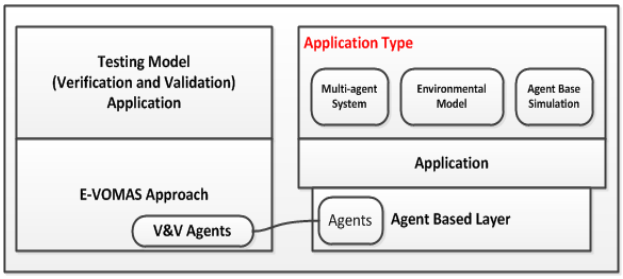

Fig. 2 System Architecture

There are two main types of the applications on which this framework have been tested software application and types of process including "multi-agent system, environmental model, agent based simulation". These agent based layer deployed in the framework access the application layer to gain the access of the software or agent based model. On the agent based layer get the access the application the e-vomas agents are deployed and the process of verification and validation (v&v) of the application executes. The time duration of the process may be long or small depending upon the complexity and computation calculation involved in the processes. The log files are obtained, once the experiment is completed.

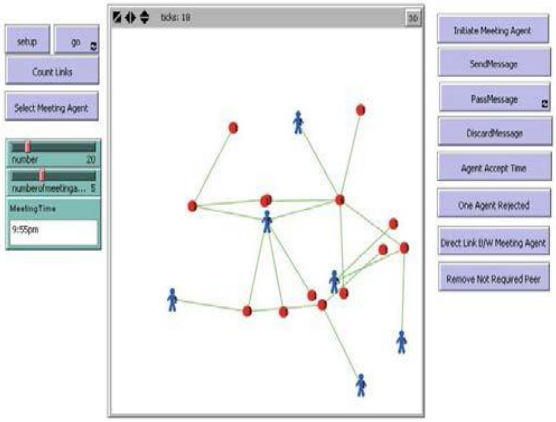

Fig. 3 Simulation Environments

E-VOMAS COMPONENT

The E-VOMAS have several components which have similar functions as compared to the VOMAS. However, in this research we have enhanced the functionality of the VOMAS by added to the new and updated the existent VOMAS role and responsibilities.

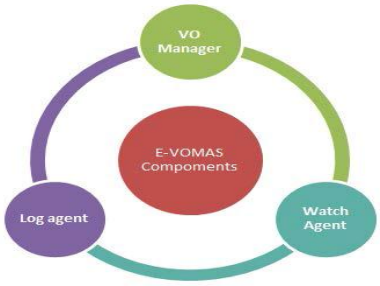

Fig. 4 Logical Components

The log agents maintains the information of all the activities which been simulated by the other agent. In case of the experiment failure, the information can be reviewed and can help to track the location of the problem have been occurred. Each activity is stored in the form list built with the help of different parameters. Main parameters of the list are "Date, Time, Duration, and Process ID (PDI). These all agents extract the information from the environment and perform the tasks accordingly. The VO Manager monitors and controls the activities of the log and watch agents deployed in the simulation. The users usually interact with VO manager and extract the required results from the conducted experiments. This proposed solution is automated and can take decision on their behalf that how many testing agent have be deployed in the simulation environment of testing.

COMMUNICATION AND COORDINATION

The communication and coordination is one of the core aspects in the proposed architecture. There are high computational processes and number of agents involved in the decision. Without the proper communication between the agent effective and efficient can be takes, the agent based system decision is based on the historical data and the information or data perceived from environments.

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MULTI LISTING TECHNIQUES

The multi listing is new techniques which have been utilized in agent based system for communication and coordination within the agent based system. The communication protocol between the agent models plays an important role in overall performance of the agent communication and coordination network. The proposed solution implements a new data communication methodology for communication between the agent to agent and agent to sink agent. There are number of parameters which have been utilized for the communication between the proposed solution such as "Weight, priority, Security and many others".

IMPLEMENTATION AND TESTING

To implement and test the proposed solution of the E-VOMAS was the critical and time consuming challenges. We faced number of issues during the evolution of the proposed study. The multi agent meeting scheduling model has been utilized for the simulation and testing of the E-VOMAS Approach. To demonstrate the effectiveness of Multi agent meeting scheduling system and E-VOMAS approach.

EVALUATION

In this section, we have evaluated various aspects of the Proposed architecture for the analysis for the software and multi agent system using the multi listing techniques for the communication and coordination between the agents. There are number of experiments which have been conducted to identify and analyze the performance of the proposed solution of the verification and validation (V&V). These experiments have conducted on the Multi agent meeting scheduling system.

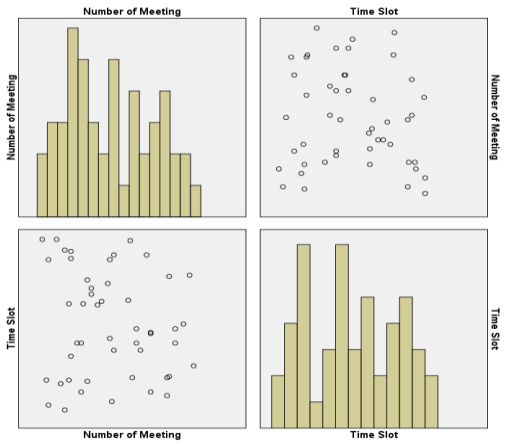

Fig 5 SPLOM Matrix (Number of Meeting and Time Slots)

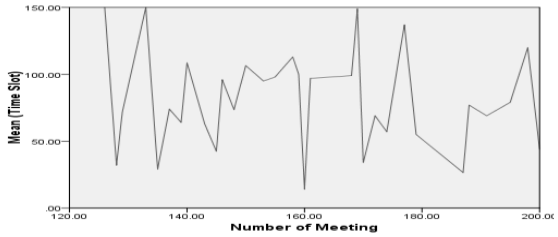

FIG. 6 NUMBER OF MEETING VS. MEAN (TIME SLOT)

The above experiment was conducted to analyze the relationship between the number of meetings and time slots. The output of the experiment has been presented in the form of the matrix. In the above experiment, we have analyzed the number of meetings with the time slot. The experiment was successful. However, in some initial stages the meeting was not initiated but later the meeting and number of different meeting have been conducted with the help of the multi agent scheduler.

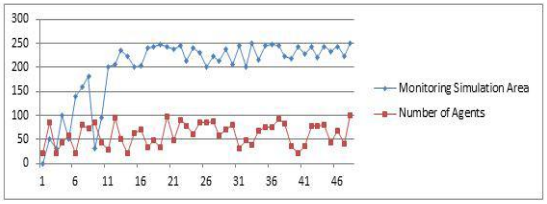

FIG. 7 MONITORING SIMULATION AREA VS. NUMBER OF AGENTS

The experiment was conducted to identify monitoring simulation area and number of agents. The monitoring is the core component of the proposed solution designed and developed for the verification and validation (v&v). The figure presents that as the monitoring area increases, the number of agent also increases.

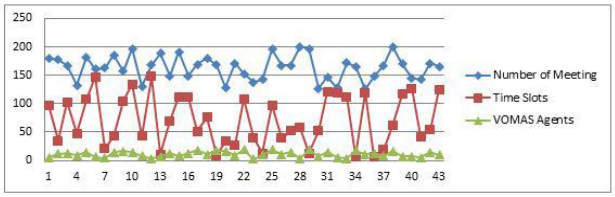

FIG. 8 NUMBER OF MEETINGS VS. VOMAS AGENTS

3. CONCLUSION

In this paper we have presented a system design approach for the verification and validation of the software and agent based model. The proposed solution of the E-VOMAS approach is based on the system layered architecture. The multi agent meeting scheduling system has been utilized for the simulation of the proposed solution. The E-VOMAS architecture is built with the help of the intelligent agent which have been programmed to take decision programmatically according to the environments.

4. FUTURE AREA

In future, we hope the introduction of an advance testing techniques for the complex adaptive system (CAS). The E-VOMAS will be enhanced for these complex adaptive systems and applications.

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