ABSTRACT

This research work proposes a set of enhanced measurement schemes for evaluating the performance of the Multi Agent Systems (MASs) at refined grained levels. This work has been primarily motivated by the fact that a fine grained measurement framework seems to be a better approach for quantifying the MAS performance attributes and hence they can facilitate the designers and developers to assess the MASs at different hierarchies. The goals of this research are derived such that to extend the support to the intended users to evaluate the performance of the MAS at different levels and they are defined as follows:

I. Improve the level of granularization of measuring the performance attributes in MASs.

II. Quantify the performance issues of MASs at the extended fine grained levels.

III. Improve the performance evaluation schemes of MASs at different hierarchies.

Here the goals are much focused and more quantifiable. The first goal reflects the level of decomposition of the MAS models w.r.t. the scheme of performance evaluation and the second goal is measurement-oriented, in which it is supposed to measure the internal components of the outcomes of the first goal. The results of these two goals form a base for the third goal, which depicts the significance of the proposed research.
This work presents novel measurement schemes for MAS performance evaluation, particularly focused on communication and coordination points of views. It is very important to note that this work quantifies the performance of the MAS at different hierarchies, which have not been attended by the prior related works. The proposed metrics models are validated by means of variety of experiments, which are being conducted across diversified sample applications. The experiments are designed such that to accommodate all the proposed metrics models at different scenarios. A MAS based distributed testing framework has been used as the common test bed in order to facilitate the experiments to be performed.

The controlled experimental study analyzed the performance of MAS at the anticipated hierarchies. The intention of these analyses is to provide the quantitative justification theory of precisely why the further one more quantitative evaluation scheme is essential for MASs. The outcomes and the promising results of the experiments proved the ability of the proposed metrics models and on the other hand, it also necessitates the need for enhanced investigations in the projected line of research.