Referee Report on the PhD thesis

"On Modeling Building-Evacuation-Route Planning and Organization-based Multiagent Systems by resorting to the P-graph Framework"

by Juan Carlos Garcia Ojeda

I present my opinion from the following viewpoints.

The structure and the style of the dissertation

The dissertation contains 5 chapters. The first one is a short introduction to the problems and it also contains the main objectives of the work. Then Chapter 2 presents the results on the building-evacuation route planning. Chapter 3 contains the results on modeling organization-based multiagents systems. These are the main results of the dissertation. Chapters 4 and 5 are concluding chapters. Chapter 4 concludes the main results and discuss the possible lines of further research. Chapter 5 collects the theses of the dissertation and the publications of the author. The structure of the dissertation is logical, the larger chapters are divided into sections. The bibliography of the dissertation contains more than 100 items, I think that this shows well that the candidate knows the literature. The dissertation also contains 5 Appendix chapters which collect the background material necessary to understand the presented results. The English of the dissertation is good, it is easy to follow it. The dissertation contains about 50 Figures, most of them helps the reader. The methods are also presented on smaller examples which makes easier to follow the dissertation. The algorithms are represented in Pidgin ALGOL code. Fortunately the author also explains the ideas of these algorithms which makes easier to understand them. Summarizing my opinion is that the dissertation is well-written and its style is good enough.

Evaluation of the topics and the results of the dissertation

The dissertation studies 2 different, slightly related problems, I evaluate them separately.

In Chapter 2 a method is presented which can transform a building evacuation route planning problem into the framework of PNS problems. Then the optimal evacuation route can be calculated as a minimum cost solution of the corresponding time-expanded process-network synthesis problem. The method is evaluated by executing the transformation on some examples from the literature of building evacuation. I think that it is a very useful transformation since it makes possible to use the tools and softwares developed for the solution of the PNS problem in case of building evacuation. One important advantage is that the software PNS-studio can also find the n best solutions which could be important in the case of that problem. I accept this transformation and its analysis as new scientific results. I note that these results are published in three international journal publications, where two of the journals has impact factor. This publication activity also shows the importance of this result.

In Chapter 3 modeling of organization-based multiagents systems is studied. This area is an important subfield of designing and implementing large, complex, and distributed systems. First in Sections 3.3 and 3.4 the problem is transformed into a PNS problem. This transformation makes it possible to use the PNS solution tools in case of the OMACS system, the maximal structure will contain all feasible OMACS-based design configurations. Later in Sections 3.5 and 3.6. a Markov chain based approach is presented to evaluate the reliability of an assignment. The results are demonstrated on an example based on the literature. I accept the results of this chapter as new contributions in the area of modeling of organization-based multiagents systems. These results are published in an international journal which has impact factor.

The publications behind the dissertation

The candidate has the following publications related to the dissertation: one book in Spanish, a book chapter in English, four international journal papers (three of them in a journal with impact factor), and some conference publications. As I know the rules of the Doctoral School require two journal papers with impact factor, therefore I think that the publication activity of the candidate is clearly enough to obtain the degree. The author has many citations for these scientific papers (more than 20 in googlescholar), and this shows the importance of the results.

The thesis booklet

The thesis booklet contains a short introduction about the topics of the dissertation and it summarizes well the results achieved by the author. The booklet is ended by the list of the publications. I think that it would be better to note the corresponding citations at the thesis points, it would help the reader to pair the results with the publications.

My questions concerning the dissertation

I have no question concerning the technical details of the work, but I have some general questions mainly concerning the building evacuation route planning part. It seems for me that in this problem usually there are some uncertainty in the input data (the possible routes, the number of people). Are their methods handling this uncertainty and looking for robust solutions? Do you think that the model of the robust PNS problem could be used here? I think that in both problems studied in the dissertation more objective functions could be defined. Are there models which use multi-objective optimization to solve these applied problems? Do you think that the transformation to the PNS framework can be also useful in case of multiple objective functions?

Summary

My opinion is that this thesis contains new contributions in two application areas. These contributions are important from an applied point of view. My opinion is also supported by the fact that the published results appeared at international conferences and journal and these papers have several citations. The dissertation is a well-structured work. Therefore I recommend to award a PhD degree to Juan Carlos Garcia Ojeda.

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