## Thesis Examiner’s Report Response

**Thesis title:** Optimización multi-objetivo en las ciencias de la vida

**PhD candidate:** Esteban López Camacho

All of the english corrections and typos that Manuel and Grégoire have noted has been corrected. Furthermore, a more extensive read has been made to the manuscript to double check other mistakes.

**Manuel López-Ibañez Infante requested changes**

1. Page 30: “a minimum of independent runs of the algorithm must be performed to obtain statistically consistent results. A value of 30 is usually considered the minimum acceptable.” Any reference supporting this? Otherwise, I think it is debatable that this is the minimum acceptable, but it could be said that it is a value often used in the literature.

*The text has been changed to:*

*“A value of 30 is considered a minimum acceptable according to the values often chosen in the literature.”*

1. Page 30: “The mere inclusion of means and standard deviations (something usual, and incorrect, in the literature) is not worth, since erroneous conclusions can be obtained. Thus, it is necessary to perform a global statistical analysis to ensure that these conclusions are significant and are not provoked by random variations.” This is formulated in a way that may confuse readers. I think what the text is trying to say is that a comparison based on the mean and standard deviation may be insufficient and that statistical testing may be necessary to assess whether differences are significant and not the product of random variations. (Cite for example [59,63]).

*The text has been changed to:*

*“The mere inclusion of means and standard deviations may be insufficient, since erroneous conclusions can be obtained. A global statistical testing may be necessary to assess whether differences are significant and not the product of random variations[64,65].”*

1. Page 31: One aspect not mentioned here is that the two metrics/indicators are Pareto-compliant [59]. Please mention this.

*The following text has been added:*

*“The quality indicators used in this thesis are Hypervolume (IHV)[67] and Unary Additive Epsilon Indicator (Ie+)[66], being the two of them Pareto-compliant[64].”*

1. Page 33: There are two Wilcoxon tests in the literature, the signed-rank test and the rank-sum test. Please specify which one is being used here.

*The following text has been added:*

*If so, a Wilcoxon’s (signed rank variant) or Holm’s tests are performed depending on the number of distributions to compare: 2 or more than 2, respectively. The KEEL (Knowledge Extraction based on Evolutionary Algorithm) [69] implementation of these tests were used in all the studies that are presented in this thesis.*

1. There are two journal papers in Section 4.1 for which nothing is explained. I would suggest that a new section is added to Chapter 4 “Summary of other publications related to this thesis” that briefly summarises the contents of those works mentioned in 4.1 but not in 4.2 and explains the contributions of the author and the connection with this thesis.

*A new chapter titled “4.3 Summary of other publications related to this thesis” has been added.*

1. In section 4.2, please include the full reference of the paper being discussed and the pages in the thesis that contain the paper such as:

Reference: [8] E. López-Camacho, M. J. García-Godoy, A. J. Nebro, and J. F. A. Montes. “jMetalCpp: optimizing molecular docking problems with a C++ metaheuristic framework”. In: Bioinformatics 30.3 (Feb. 2014), pp. 437–438. doi: 10 . 1093 / bioinformatics / btt679.

Pages in this thesis: 47-48

In [8], …

*Full cites as requested has been added.*

1. Chapter 5: Please briefly comment on any new knowledge or conjectures about the reasons behind the improved performance and what general conclusions can be extracted from these reasons to support future research.

*The chapter 5 has been increased with new text.*

**Grégoire Danoy requested changes**

1. References to the articles that correspond to the thesis contributions could have been already introduced in chapter 1 (i.e. section 1.3).

*References has been added as requested.*

1. To ease the understanding of the different metaheuristics presented in Chapter 2, some pseudo-codes could have been used to describe them in a less verbose way.

*Pseudo-codes have been opted to not been included to not increase so much the length of the chapter. We consider that interested readers can refer to the correspondant references to get more details of the algorithms.*

Málaga, October 20, 2017

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