



## Report on the Faculty Exchange Program

### CMU-Portugal – Fall 2013

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This report briefly summarizes my activities at Carnegie Mellon University (CMU) from September 17<sup>th</sup> to December 7<sup>th</sup>, 2013. My host was Prof. Edmund Clarke, Computer Science Department at the School of Computer Science, CMU.

The main goals to participate in this program were twofold: (1) interaction with other faculty involved in teaching Algorithms courses at the undergraduate level and (2) start new collaborations with faculty and researchers for future research projects.

The first goal involved getting acquaintance with subjects, structure, classes and evaluation criteria of Algorithms courses. The main focus was on the Algorithms course 15-451. Interaction with Prof. Avrim Blum was crucial in understanding the dynamic of the course, goals and options taken on how the course is structured and student's main difficulties. It was very helpful in understanding how students are introduced to computer programming and algorithms at the undergraduate level.

The second goal was focused on interactions with Prof. Edmund Clarke, PhD. students and researchers working in the research group. Several meetings took place in order to establish common ground for future collaborations. In particular, preliminary work was done on inference of gene functions in Boolean networks. These networks are commonly used as an abstraction of how genes interact in interconnected networks named Gene Regulatory Networks. Usually, biologists have partial knowledge of some gene interactions inferred through observations of gene expressions. However, they need computational tools in order to establish the actual expressions that predict the behavior of each gene. A first software prototype to infer these gene functions was produced and validated using the well-known p53 network. Moreover, other problems in systems biology were identified where Boolean methods can be applied. In particular, work on using logic-based models for drug selection to target genetic diseases is to be explored. We expect that stronger collaborations result from this initial effort.

I would like to thank the CMU-Portugal Faculty Exchange Program for supporting my stay at CMU during this period, and providing the opportunity for further research collaborations and experiencing a great work environment.

Lisbon, December 12<sup>th</sup>, 2013

Vasco Manquinho