First International Computer Programming Education Conference

ICPEC 2020, June 25–26, 2020, ESMAD, Vila do Conde, Portugal (Virtual Conference)

Edited by

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Contents

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Preface

At a time when the Covid-19 pandemic is widespread worldwide, many laboratories and research centers are trying to find a solution to the problem of the virus and its mutations. In this difficult period, problem-solving skills are being applied mostly for diagnosing illnesses and developing treatment plans, and, somehow, in the short term, discovering a vaccine.

This is just one example of the transversality of problem-solving skills and its crucial importance at all levels of our society. In reality, problem-solving is one of the key skills of tomorrow's society future. As opposed to a hard skill that is learned mostly through education, problem-solving is nonetheless one of the most valued attributes employers seek in their job candidates. In fact, it's hard to find a professional position that doesn't require problem-solving skills of some kind.

Several levels composed the problem-solving process from analyzing factors which contributes for the problem, generate and evaluate the best solutions, implement a solution to assessing the effectiveness of the implementation. In short, problem solving requires creativity, intuition, knowledge, and skill. Nevertheless, it also requires practice.

Practice in the computer programming domain boils down to solving programming exercises. In the last decades several tools appeared to foster practice by introducing online environments with automatic evaluation. These type of tools relief teachers of the burden of the manual assessment which is clearly time-consuming and error-prone. Despite its regular use, programming courses still have high failure and dropout rates justified by the subject's complexity and obsolete teaching methods. Both affect dramatically the student's motivational levels. In order to overcome this issue, many proposals appeared in recent years to make programming courses more personalized and funnier. Personalization can be obtained through interaction and experience which can be used with machine learning algorithms to adapt the programming exercises to students based on their progression pace and knowledge. Fun has a positive effect on motivation levels, determining what we learn and how much we retain. One of the biggest challenges is how can inject this last facet in existent learning environments. One of he obvious answers is by using gamification. Despite its early success, gamification cannot be seen as the bullet-proof and should be used in a wise and balance way.

It is in this context that educators, scientists and practioners begin to explore new ways to enhance the teaching-learning of problem-solving skills mediated by intelligent online systems with twofold vision: the support of automatic evaluation with rich visual feedback and the delivery of progressive and gamified exercises adapted to different student knowledge levels and profiles.

This book gathers all the accepted articles submitted to the first edition of the International Computer Programming Education Conference (ICPEC). The book presents a comprehensive and recent view of the emerging trends, techniques, paradigms, frameworks and tools for the teaching-learning process in the computer programming domain. At the same time, it identifies new trends on this topic from pedagogical strategies to technological approaches.

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