Design and Use of Mobile Apps to Support Multiple Techniques in Algorithmic Thinking

S.R. Subramanya
Department of Engineering and Computing
National University, San Diego, CA 92123, USA

ABSTRACT

Information and computation are ubiquitous and are the enablers of almost all domains in the real–world, such as manufacturing, transportation, engineering, sciences, healthcare, banking and finance, public administration, commerce, etc. It is safe to say that algorithms and data structures are the drivers of all computing. Students and professionals in the Computing disciplines (Computer Science, Computer Engineering, Data Science, Information Systems, Artificial Intelligence, etc.) need to have a good grasp of algorithmic techniques and algorithmic thinking skills for effectively solving information–rich, information–driven, real–world and societal problems. Although there have been explosive growths in the availability of mobile Apps, their numerous benefits for learning by students in higher education and by working professionals are yet to be fully realized. This paper presents two aspects – (1) a few techniques, derived from several years of teaching experience, used along with the traditional ‘linear’ technique to augment algorithmic thinking skills, such as (a) coming up with counterexamples for several problem statements / claims; (b) building algorithms using predefined computing blocks, and (2) design aspects of mobile Apps as supplements to support the techniques of (1), which facilitate (a) consolidation of the concepts taught in classroom; (b) animated examples; (c) interactive practice problems; (d) self–assessment; (e) support the use of multiple techniques to convey the (difficult) concepts. These are expected to provide a rich and effective learning experience in algorithmic thinking.

Keywords: Algorithmic thinking; Algorithm development; Non-linear learning; Learning supplements; Mobile Apps