

# Exploring Visualisation and Game-Based Learning tools for teaching Data Structures and Algorithms

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Literature Review Seminar

# Research Intent

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# Why DSA?

Data Structures and Algorithms are an essential topic in Computer Science-related fields, and form the foundation of many higher-level concepts in CS.

# DSA Curriculum

The ACM CS2013 provides guidelines on subjects that should be taught in an undergrad CS course. Algorithms & Complexity is identified as a core Knowledge Area and within that the knowledge unit of Fundamental Data Structures and Algorithms.

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## Our Implementation

We will focus on teaching Fundamental DSA for the purposes of the tool we intend to develop.

# Fundamental DSA in ACM CS2013

- ▶ Simple Numeric Algorithms
- ▶ Sequential and Binary Search
- ▶ Quadratic and  $\Omega(n \log(n))$  sorting algorithms
- ▶ Hash tables and collisions
- ▶ Binary search trees
- ▶ Graphs and common graph algorithms
- ▶ Heaps
- ▶ Pattern matching/string algorithms

# DSA Learning Outcomes in CS2013

We will target some of the learning outcomes outlined in CS2013...

1. Implement basic numerical algorithms.
2. Be able to implement common quadratic and  $O(N \log N)$  sorting algorithms.
3. Discuss the runtime and memory efficiency of principal algorithms for sorting, searching, and hashing.
4. Demonstrate the ability to evaluate algorithms, to select from a range of possible options, to provide justification for that selection, and to implement the algorithm in a particular context.

# What is Algorithm Visualisation?

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# What is Game-based Learning?

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