

STUDENTS' ACCEPTANCE OF ANIMATED INTERACTIVE PRESENTATION OF SORTING ALGORITHMS

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Introduction

- Programming as a profession is in high demand
- Importance of the education of young computer experts
- Understanding programming concepts is a challenging task for novices
- Abstract computer code format and syntax is not always the best way to make students understand programming principles
- Interaction and visualization

Students and programming

- Programming is important
- Many authors agree that to learn how to program is a very difficult and challenging task
- Students tend to spend a lot of time and effort on grasping pure syntax
- Little time for understanding the main concepts
- Most of programming classes still use mainly traditional way of teaching

Visualization in programming courses

- Willingness of professors to adopt this kind of tools
- The need for some kind of interaction
- There are many existing visualization tools such as: Balsa-II, XTANGO, JHAVE, BlueJ, Jeliot, TRAKLA2, ALVIS and ViLLE. Studies however still show variations in results of using these kind of tools
- Constructivism learning theory support

SortExpert

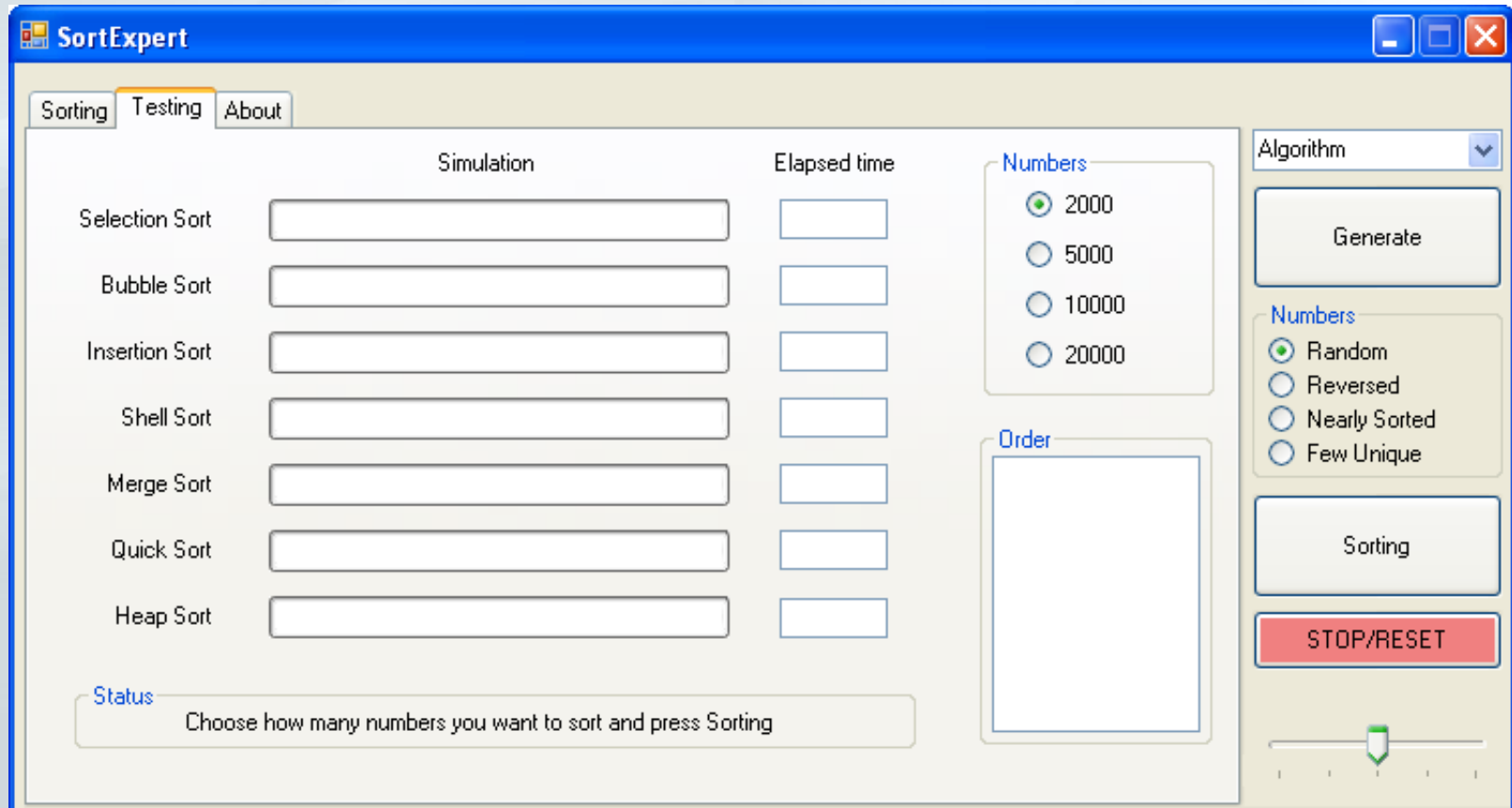
- Introduction of interaction with computer increases focus and motivation
- SortExpert enables students to visually observe the whole process of sorting for some particular sorting algorithm
- Simple and minimalistic design and interaction
- Support for sorting algorithms that are commonly found in programming courses: Bubble sort, Heap sort, Insertion sort, Merge sort, Quick sort, Selection sort and Shell sort

SortExpert features 1/2

The screenshot displays the SortExpert application window. The title bar reads "SortExpert" and includes standard window controls. The interface is divided into several sections:

- Navigation:** Tabs for "Sorting" (selected), "Testing", and "About".
- Generated numbers:** A row of ten boxes containing the numbers: 67, 62, 37, 92, 68, 94, 62, 69, 1, 41.
- Visual Representation:** Below the boxes, the same ten numbers are shown inside circles, representing the current state of the array being sorted.
- Algorithm Selection:** A dropdown menu on the right is set to "Bubble Sort".
- Number Generation Options:** A group of radio buttons labeled "Numbers" with options: Random, Reversed, Nearly Sorted, and Few Unique.
- Control Buttons:** A "Generate" button, a "Sorting" button, and a red "STOP/RESET" button.
- Speed Control:** A slider labeled "Speed" with a green indicator.
- Details Section:** A section at the bottom with labels "Algorithm:", "No. of comparisons:", and "No. of replacements:", each followed by an empty input field.

SortExpert features 2/2



SortExpert Evaluation

- 182 information science students
- TAM (Technology Acceptance Model)
 - perceived usefulness (U)
 - perceived ease of use (E)
 - attitude towards using (A)
 - behavioral intention to use (BI)
- Before the questionnaire was given the students were introduced to SortExpert during one lesson
- Cronbach's alpha values for every of 4 stated groups of questions were above 0.8

SortExpert Evaluation results

- The results show that students find SortExpert useful and easy to use.
- The results also show that students find SortExpert to be useful and beneficial in learning sorting algorithms.
- The usage of SortExpert also positively affects the motivation of students to learn programming
- Objective testing in form of knowledge tests
- The results of the test gave 45.60% accuracy for the first test and 72.41% accuracy for the second test
- Increase of 59.79% after using SortExpert

Conclusion

- Programming is important
- Programming courses have high failure rates
- Programming is perceived as hard to learn
- Visualization and interaction are beneficial
- SortExpert with its simplicity and focused presentation was perceived as useful by students
- Increase of tests accuracy after using SortExpert
- Including of computer aided learning and interaction is beneficial for students
- Further work: expanding SortExpert applicability and scope