Animation of understanding the correctness of sorting algorithm

The software allows user to join a beginner tutorial of understanding correctness

The software allows user to watch an animation of the introduction of termination

The software allows user to watch an animation showing what partial correctness is

The software allows user to watch an animation showing what total correctness is

The software allows user to watch an animation showing how several correctness rules work

For the tutorial, the first animation will show a simple algorithm that takes only one legal input and output a correct answer. This shows the simplest correctness of a simple algorithm

The second one will introduce partial correctness. For algorithm which has a loop, this part shows its correctness in two conditions, terminate and not terminate.

The third one involves total correctness which emphasizes an algorithm must terminate and output correctly for all of the legal input

The fourth one will show how several rules we are going to use in proving the correctness of sorting algorithms work.

Animation of proving the correctness of sorting algorithm

The software allows user to watch an animation showing the whole process of proving a sorting algorithm

The software allows user to step backward or forward when watching the animation of proving

The software allows user to practice proving in an animated way

The software allows user to complete the proving process by choosing a proof rule in practice part

The software allows user to get hint in the practice part

The software allows user to download a cheat sheet of a proof process of a particular algorithm

We focus on the knowledge we have learned in the ACE class, which means we will display the animation of the process of proving correctness using the proof rules. We think using animation rather than a long text to explain is easier to understand.

The one module is to show the animation of how to use the rules. For example, providing some sample to require using the assignment rule, then we show how to switch the position of variable step by step via animation.

Another module is to display the proving step in sequence. For example, if we need to prove the while loop, firstly, the animation shows how we choose one proper invariant (maybe displayed the Boolean table). After that, we will apply the proof rules, but the method will be not displayed directly, the recent step needs to be executed will be highlighted, then the rules will be applied, or we will let users to choose the correct rules to use, then the postcondition can be displayed. Therefore, the process from top to bottom will be shown, and we might also show full solution from bottom to top(to show how to get precondition) to make it more sense. If we need to prove the total correctness in advanced, the process to find the variant will be shown using the same method.