Evaluation and Reflection

**Assessment of the product**

After two semesters’ study and work, we finally finished our software which completes data visualization of a part of the calculation of Particle filter. Some assessments of the product including good and bad reviews are as follow

* The software of our group has completed most of the requirements.
* The size of our software packages is very small, and it is easy for customers to download and use.
* Our software can be cross-platform.
* Our software has more than one installation approaches for customers to choose. They could download an installation package or portable version to start using our program.
* Our software implements data visualization, the result of each change in data is straightforward on the graphics.
* Our software can import and export data. We can not only use an existing data to complete data visualization, but also export data according to the image that we have generated.
* Our software only performs 70% of the expected functionality, and other functionalities have not been realized for some reasons including an extra algorithm. We planned to provide more than one algorithms for customers to choose including “Fully adapted Particle filter” in “Auxiliary Particle filter”, but we did not complete it at last.
* The speed of the software is not optimized well. The software would run for 1.6 seconds if we set the number of particles to 100. But if the number is increased to 500, it would run for 7.9 seconds.
* Our software’s language choice is not the optimal choice, we had tried some other languages such as python. Using python could optimize operation time but it adds new problems which increase user load. For the sake of the user, we use JavaScript as the language of our software.
* Our software has not been tested by Alpha text, also named informal acceptance test

**How to improve**

* We still have a lot of room for improvement in language selection. After lots of steps’ screening, we chose JavaScript. We do not think it is the optimal solution, although it is a result considering the balance of code difficulty, package size, and some other factors. But from the aspect of the functionality and software instead of development difficulty and the burden of the customers, we would choose multithreading JavaScript or other advanced languages.
* Because the software’s loading time will become longer as the number of the particle increasing, a progress bar can let our customers see its loading process intuitively.
* If the parameters have been modified, the software would generate a new image according to the new data. Sometimes customers may need both the old image according to the old data and the new image with its data to contrast. If there is a contrast window which could contrast the data and images between old and new, the software will give customers a more intuitive experience.

**Assessment of the process**

Our teammates cooperate better and become more efficient after nearly one year's effort and adjustment. It is no doubt that the accomplishment of the project is a result of our concerted effort. From the perplexed start to the efficient cooperation later, we experienced a lot. During this period, there is something rewarding and also something that needs improvement. The followings are the assessments of our project.

* The five members of the process united in a concerted effort, maintained a high degree of activity and attendance.
* Team members communicated frequently and contacted our supervisor when we met problems, and we were all hard-working and willing to work.
* At first, all the members were learning about the basic theory of the Particle filter. We waste too many too much time on the foundation of mathematics and it is not necessary.
* The progress of software design was slowed down because in the initial stage we spend a few weeks learning math basic together in low efficiency.
* We divided our group into two teams, one is responsible for algorithm implementation of Particle filter, and the other is responsible for software design. This had greatly speeded up our process.
* Our project nearly had no progress during the Chinese Spring Festival holiday. This affected the subsequent progress.
* Though we communicated with our supervisor positively and frequently, the math problem of Particle filter is still hard for year two student majored in computer science, which is responsible to the incomplete function implementation of our final software.

**How to improve**

* At first few weeks, all the meetings with our supervisor were like math lectures, every member of the group wanted to understand what Particle filter is and its mathematical principles, that was meaningless. If we divided our team in an inchoate time and have a clear distribution of responsibilities, we would save a lot of time and catch up progress.
* We should work harder during the winter holiday.

**Summary**

Although we encountered many obstacles in the development process, due to the lack of experience, we took many detours, but we finally made meaningful achievements and gained valuable experience. In this project, we improved our understanding of algorithms, learned new mathematical knowledge, and tried various code languages and frameworks. From the very beginning, we didn't know what Monte Carlo was, until we could transform the particle filter into the algorithm that we were familiar with. And then we made the software which completes data visualization. Most important of all, we understand the importance of a team to software engineering. Through the constant grinding, joint efforts and collaboration among our team members, we've come to realize how powerful a team can be in this project. We know that the software has many shortcomings and needs improvement, but we are still proud of our software. This is the fruit of our team.

We are going to express gratitude to our supervisor Dr. Liang and our tutor Dave’ s strong support and help for our project. Their rich experience and deep understanding on algorithm, schedule management and software development are undoubtedly the key to our project. Without their help, we cannot succeed.