Conclusion

Our team comes up with a strategy on what would be the most efficient way to create a aerial light show outdoor in response to the Mayor's requirement. We utilize the algorithms including Euclidean distance, binary integer programming, quadratic function and Bezier curve to model and optimize the flight path. We divided the whole modeling process into four parts and utilize different algorithms in each part and also provide more than one plan for each in order to optimize the whole model.

In the first taking-off process, we calculate the Euclidean distance and clustering analysis in order find out the minimal value of the total flight paths. Then we change our algorithm into integer programming to find the global optimal solution. We also utilize a lot of functions to improve our model in different aspects. For instance, the Bezier curve is applied to make the animation of flying more vivid, and quadratic function is used to avoid the potential crash for the safety concerns. All these theories and programs lend strength to our model and make it more feasible and suitable.

Our team also does the sensitive analysis which calculates the potential crashes after changing the minimal safety distance, and the result shows a relatively strong stability of our model, which is definitely one of our model's advantages. Besides, our model can also be applied to more complicated situations since all the programs and algorithms are generally applicable and also all of them are very commonly use in nowadays mathematic modeling so they are not difficult to realize.

While our approaches and models were effective and produced results, there also remain several types of model weaknesses including the difficulty of Multiobjective programming. However, our team believes based on the model we have built, the audiences will definitely enjoy this visual feast.