Smart Cities: Visualising data for the Civil Engineer

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1 Aim

The aim of this project is to produce a software which Civil Engineers can use to better understand data provided by the UK government. This research into Smart Cities and the software that will be produced, will be the basis of my PhD in Civil Engineering.

2 Plan

This section will now explain the various tasks needed to complete the project.

2.1 Research literature on Smart Cities

This project has a focus on two main elements; the software that I will create, and the research done for the summer. As the aim for this project is to create a software under the topic of Smart Cities, it is important that I understand what actually makes a city smart. This research will aim to:

1. Understand what makes a city smart.
2. How more efficient technologies can help Civil Engineers.
3. Examples of Smart Cities around the world.
4. Examples of other software that are being used to make a city 'smart'.

2.2 Research data provided by the UK government

This task is to find data that currently is not being used, and to run it using the software in order to better understand that data.
The site is : data.gov.uk
The site currently has over 40,000 different data sets, with all the data being in different formats, lengths and types. The data currently is not being used by Civil Engineers as the data is in large quantities, updated regularly and also in file formats that Civil Engineers are not used to.
This task will aim to chose certain data sets that I believe require further investigation.

2.3 JavaFX and CSS

I have decided that I will learn JavaFX, and that the entire software will predominately be written in JavaFX. After researching ways that will allow me to visualise my data within JavaFX, JavaFX had stunning libraries and sample projects (through oracle), that I believe will allow me to create a beautiful, easy to understand software that also will help me become a better java programmer. As JavaFX requires the use of CSS, I will also learn about CSS, and implement it to create a more sophisticated software.

2.4 R - Statistical insight into the data collected

In addition to JavaFX, another aim is to implement some R code within my program. This will help in understanding what the data is actually telling us. I will create some simple programs that will combine R with Java. Within the final software, the aim is to have implemented R code, that will be called from within Java, and then execute through the REngine class(the interface between an instance of R and the Java VM).

2.5 Java Gathering data

I will gather the needed data from the data.gov.uk site. The site has large data sets that are actively updated (e.g. some are updated every 15 days). This data will passed to the software, and will then proceed to analyse and visualise the data.

2.6 Final Software product

The final software that will be easy to use, understand and beautiful in design.

3 Conclusion

To conclude, my individual aims for this project are:

1. To create a software that I can use during my PhD to analyse and visualise the data.
2. To improve my programming skills through
    - Learning and using various design patterns.
    - Learning and using JavaFX, CSS and R.
    - Learning about visualisation of data, and the impact that having visualised and analysed data could have on a Civil Engineers understanding of the data.
3. To better understand how technology will create more Smart Cities.

I am creating this software as there currently is no other way to analyse the data that the uk government data provides. As Civil Engineers, the data is not useful, however there is large and useful information that is currently not being used. Hence, this project aims to bridge Civil Engineering and Computer Science, to help Civil Engineers make better decisions based on real data.