

CLIMATE CHANGE ANALYSIS AND VISUALIZATION WITH UNREAL ENGINE

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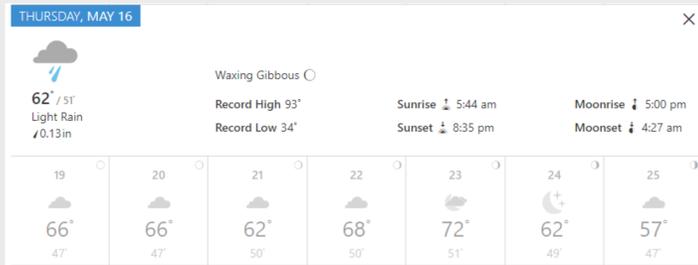


Figure 1: Climate Information from Weather.com

B	C	D	E	F	G	H
DATE	DAY	DESCRIPTION	HIGH	LOW	PRECIP	Rain amount
12-May	Sunday	Clear	91°	30°	10%	0
13-May	Monday	Clear	95°	33°	10%	0
14-May	Tuesday	Mostly Cl	91°	33°	70%	0.3
15-May	Wednesday	Cloudy	89°	35°	50%	0.19
16-May	Thursday	Light Rain	93°	34°	80%	0.13
17-May	Friday	Cloudy	94°	34°	50%	0.02

Figure 2: CSV Transformation of the Climate Information



Figure 3: The visualization of Corvallis climate at Unreal Engine

INTRODUCTION

As one of database types, CSV type database is widely used by many people because the type serves various useful purposes for business, engineering, and environment. However, the CSV type database could be complicated to understand because it is usually written on spreadsheet like Microsoft Excel format. Therefore, data visualization is very important to make understandable databases. Furthermore, data visualization has become an indispensable part of the business world and an ever increasing part of managing our daily life [1].

METHODS

Unreal Engine Blueprint

- Unreal Engine has good flexibility, so it takes various data types if a user installed proper 'Unreal Engine Plug-in'. Unreal Engine supports importing CSV file extension on blueprint system for storing data values.

Unreal Engine Materials for Visualization

- As a game development engine, Unreal engine can create and express lots of real-world materials. To express weather system, referred to weather system tutorials by handling materials.

Datasets from weather.gov and NOAA

- Utilizing datasets is a main core of this research. Therefore, used datasets of 2010 and 2018 in Oregon weather stations from weather.gov and NOAA.

RESULTS

- Based on the dataset, the Unreal Engine changed material variables for visualization.
- If the input dataset format is different with the Unreal Engine material variables on visualization blueprint, then it occurs errors and happens nothing.
- There are many rainy days on visualization because of Oregon climate's characteristics.

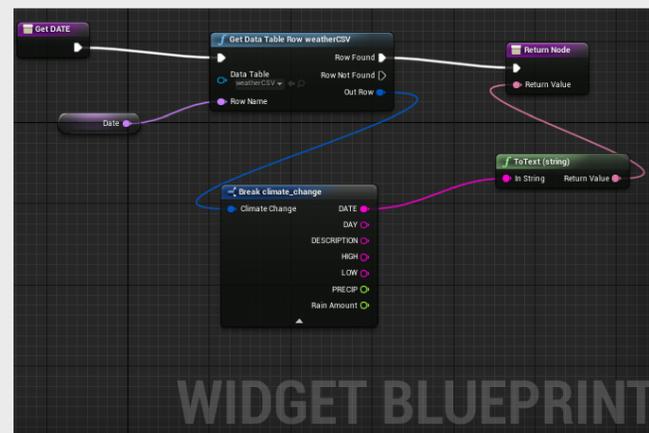


Figure 4: Application of CSV data on Unreal Engine Blueprint

DISCUSSION

- Lots of visualization variables in the weather tool makes the input dataset be complicated to fit variable's format. Therefore, the visualization variables need to be simplified.
- There is a technical limitation to import csv type dataset into Unreal Engine blueprint. In the future, it needs to add csv type dataset interpreter or new plug-in for flexibility of weather tool.
- In the future, Creating user interface is necessary to make any user uses the weather tool easier.

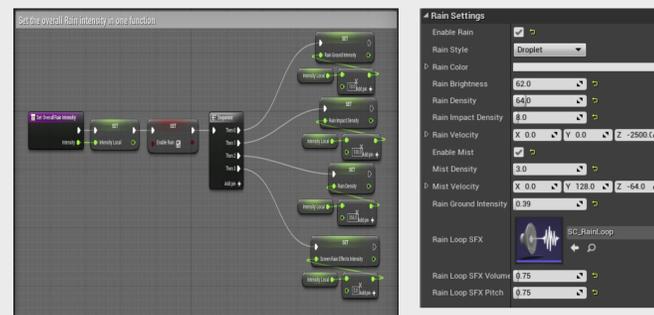


Figure 5,6: Visualization Variables for Rain Settings on Unreal Engine

CONCLUSION

Through this project, I found that Unreal Engine has infinite possibilities on the visualization of datasets because Unreal Engine is providing great flexibility and tools. Most of all, everyone can learn about Unreal Engine easily. In this project, I analyzed climate change dataset of the Oregon by NOAA and weather.com, but provided CSV files were hard to understandable. Therefore, I needed to change the CSV file to fit on the Unreal Engine. Although I focused on the screen visualization, Unreal Engine provides virtual reality(VR) and augmented reality(AR) modules for any project. Thus, I plan to apply this visualization project on those modules.

REFERENCES

- [1] C. Pittenturf, "What is Data Visualization and Why is it Important?," *CIO Review*, 2018, online.

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