Research Experience and Visualization of Parameters from Multiple Numerical Simulations

Jonathan Vega

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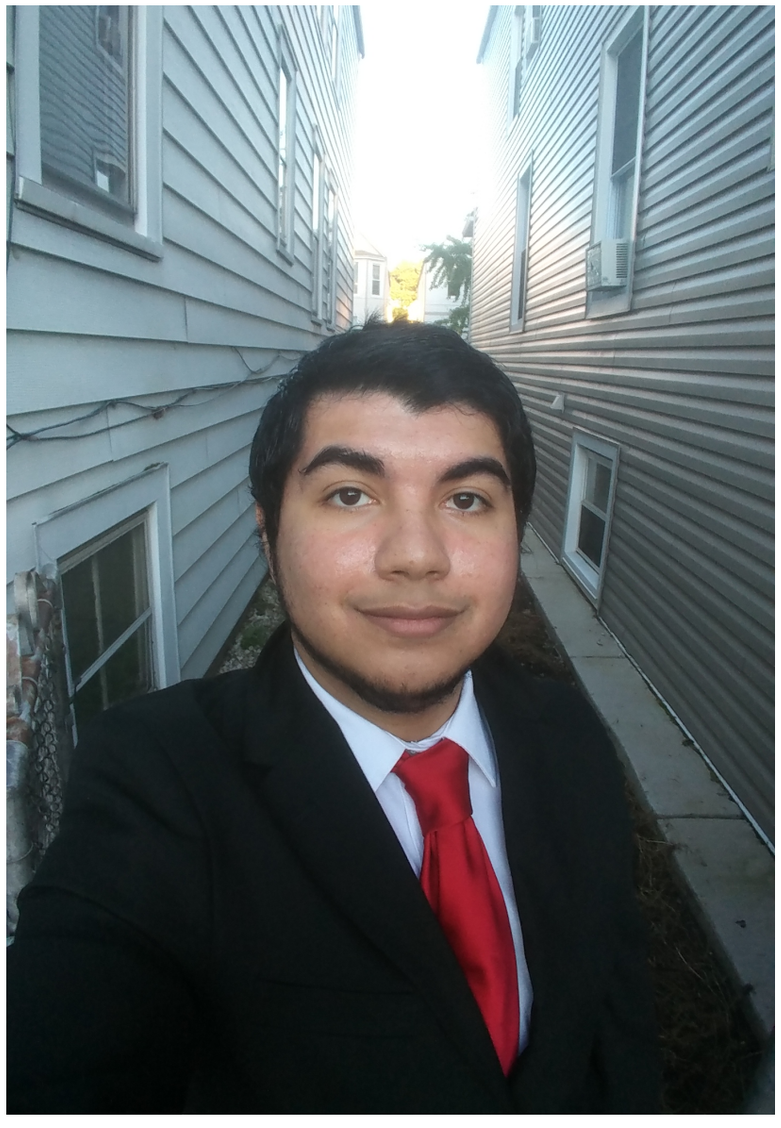
Outline

- Background of myself
- Motivation for the project
- Why data visualization matters
- How I prepared for my project
- Results from my research
- Writing a technical report
- What I learned from this experience

Background of myself

Jonathan Vega



- Member of the Colorado River Indian Tribes

- Graduated from UIC with a Bachelor’s in Computer Science last Fall 2020

- Participated in research under Dr. Georgeta-Elisabeta Marai from the Electronic Visualization Laboratory

- Awarded CURA Award Summer 2020

Motivation for the project (1 of 3)

Dr. Paoli and Dr. Marai

- Dr. Roberto Paoli - Research Assistant Professor in Mechanical and Industrial Engineering that received NSF grant in 2019 to research the physics of aircraft contrails
- Dr. Georgeta-Elisabeta Marai - Associate Professor of Computer Science and a faculty member of the Electronic Visualization Laboratory

Both working together on the project “High-performance Computing and Data-driven Modeling of Aircraft Contrails”

Motivation for the project (2 of 3)

What are contrails?

- Line shaped clouds created from jet engines
- They contribute to global warming
- Formed form water exhaust that freezes in atmosphere
- Can last from seconds to fourteen hours
- Causes heat from earth surface not escape

Motivation for the project (3 of 3)

Personal Motivation

- Global warming affects my tribe’s culture negatively
- Colorado River is pivotal for local tribal nations
- Flow of the river is slowing down due to global warming

Why is data visualization helpful

visual representation of a set of data

- Easier on our brain to process information versus analyzing data sets
- Data visualization has been used for hundreds of years
- Regarding research, helps brainstorm hypotheses and abstraction.

How I prepared for my project

Getting started

- Learned HTML, CSS, JavaScript, and D3 framework through online tutorial sites.
- EVL (Electronic Visualization Laboratory) and Dr. Marai team meetings
- Working with other students
- Semester Plan

Week 2

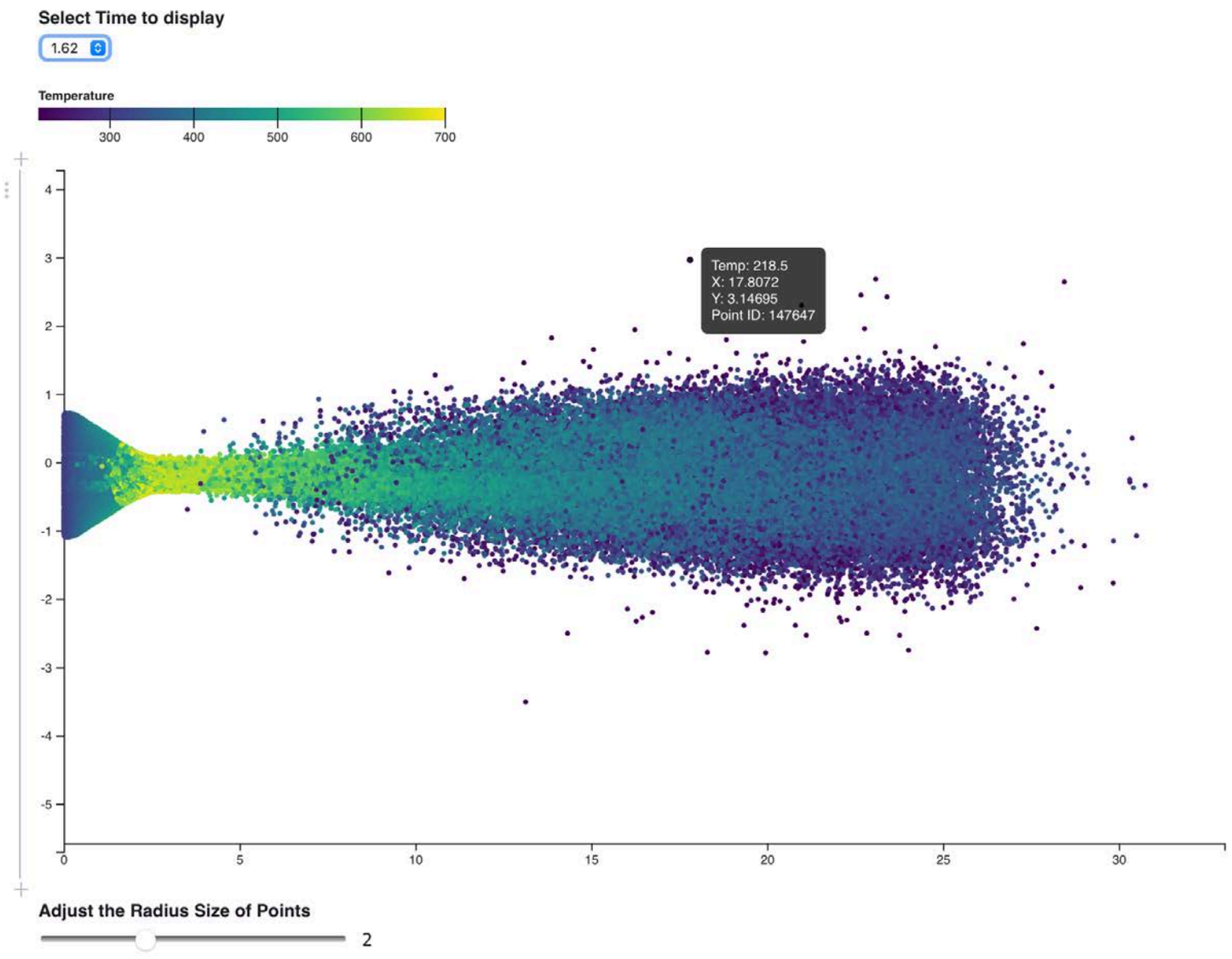
May 31, 2020 (Sunday)	N/A
June 1, 2020 (Monday)	50% done with Javascript (3hr)
June 2, 2020 (Tuesday)	75% done with Javascript (3hr)
June 3, 2020 (Wednesday)	90% done with Javascript (2hr)
June 4, 2020 (Thursday)	100% done with Javascript + Learned jQuery + Made HTML5 Canvas demo using jQuery (10hr)
June 5, 2020 (Friday)	Watched All Lynda D3 Videos and messed with D3 myself for fun (9hr)
June 6, 2020 (Saturday)	Began Website Design (4hr)

Week 2: Finish Learning JavaScript and jQuery, as well as beginning foray into learning the D3 library.

Results from my research

2D Visualization of Particle's Temperature

- Used entire data set to create visualization
- Hot being the brightest yellow to cold being darker blue
- Slider controls radius of each particle
- Visualization helps express temperature of particles quickly



Writing a Technical Report

- Designed similar to this presentation, details the goal of my research
- Uses technical jargon to explain

What I learned from this experience

- Remote learning and doing research help prepare for opportunities after graduation
- Research didn’t seem like my cup of tea, however non-work related communication helped forge new friendships and experiences
- Overall I learned that communication is the essence research

Thank You

- CURA
- EVL
- NSF CBET 1854815