

Midterm Application Report

3D Track Analysis & Graphing

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Introduction

P3D files are data files containing a set of points per each 3D track of a particle and their frame timing captured through industrial cameras using machine vision software at the Graduate School of Oceanography. These sets of points were borrowed from an experiment that filmed plankton movement under controlled conditions. The software used to generate these points was not written by us but permission was granted for use of it in this project.

Our goal¹ in creating this application was to analyze 3D track files in a generic way, rather than in the application specific ways that had been previously implemented using MATLAB at GSO.

Functionality

Application is a script² written by Noah Davis and Jie He that takes a user defined .p3d file then returns information and graphics regarding the data contained in that file. It is written in Python 3 using Anaconda, Pandas data analysis tools, and matplotlib.

A GUI may be implemented in the future for easier file processing.

¹ We have not, currently, met the goals outlined in our original proposal. The originally proposed dataset was bad (incorrect values). We had to move toward an attempt to generate new data using Python instead of MATLAB scripts. We believe that we can generate correct values and may like to do that for our final project.

² Much of the time spent on this project was used to understand the generation and representation of these datasets. Given more time we would like to generate more statistics and create models for this data.

Use Case

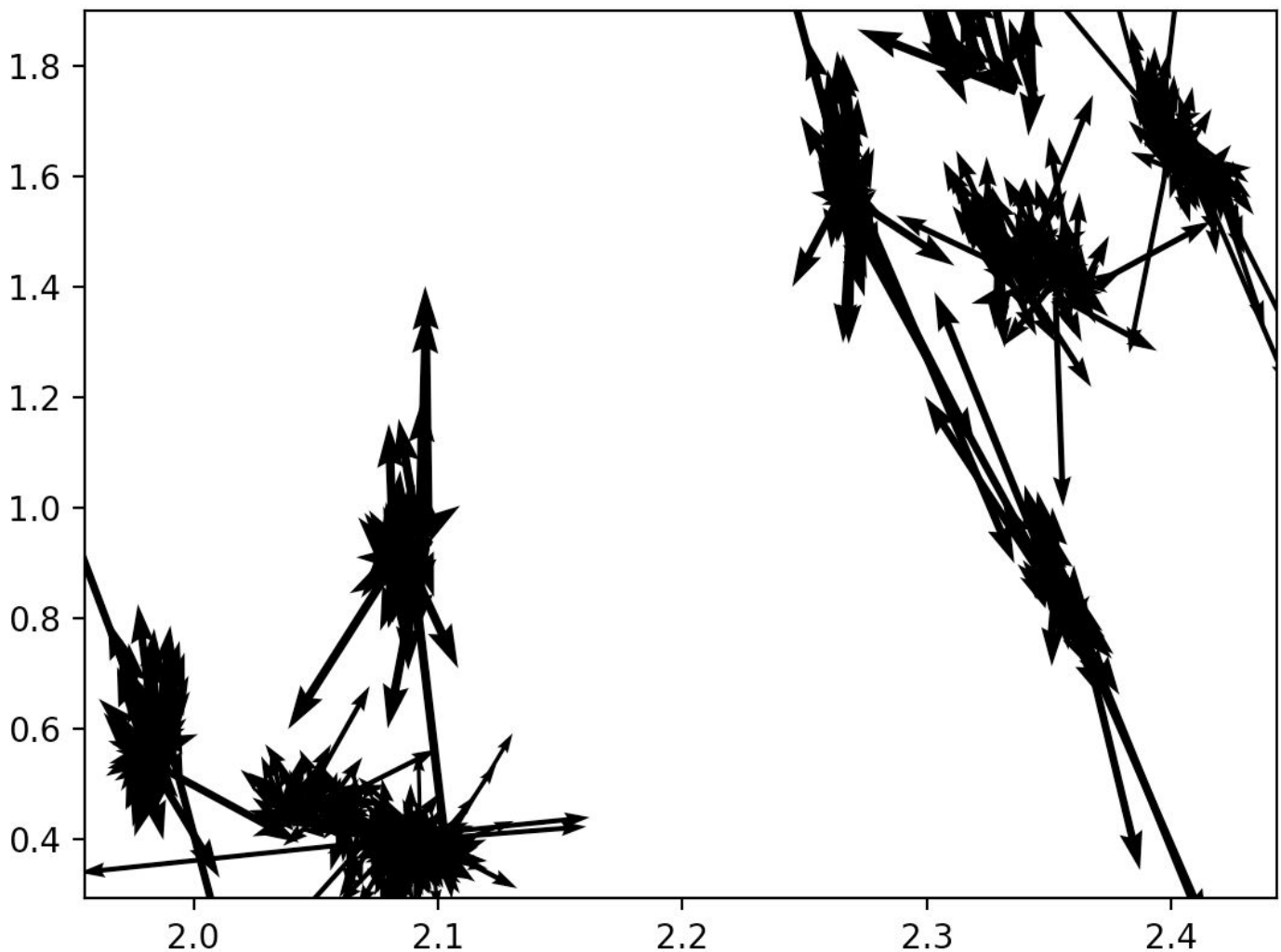
Upon executing main.py, the user will be asked to input the name of a file to be analyzed:

```
python3 main.py  
Enter a filename:
```

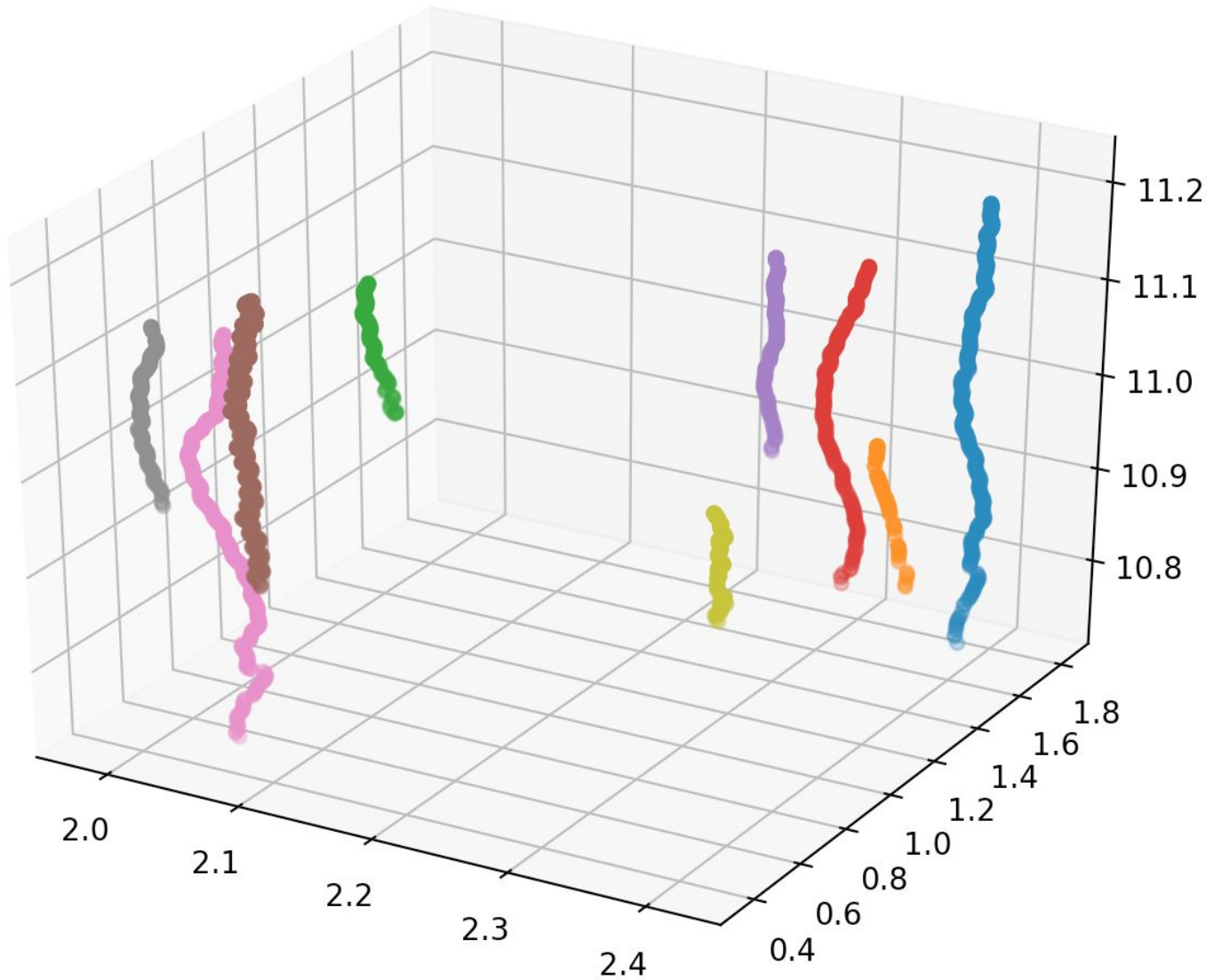
Data will be processed and graphed upon entering a valid p3d file name (including extension).

```
Enter a filename: 003_1250.p3d  
Processing data...
```

A vector cluster graph will be generated for the two dimensional vectors of each track particle (there are 9 particles in this example):



A 3D graph will be generated with the trajectory for each detected particle (again, in this example, 9 particles):



A detailed vector and point graphs will be generated for each individual particle trajectory (only one example here):

