Exoplanet Index

Samad Ali Capstone

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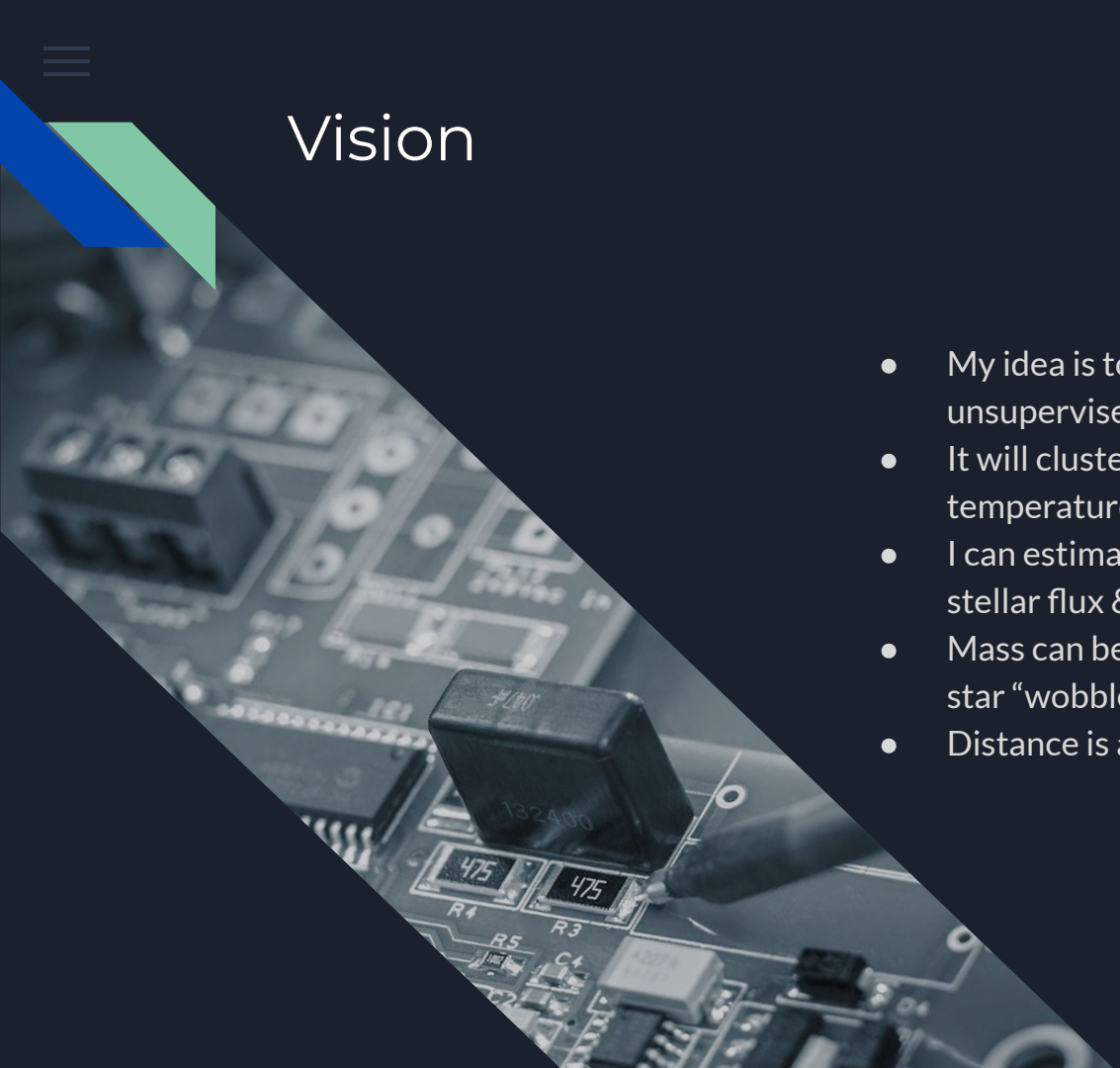
Overview

- NASA has discovered thousands of exoplanets - more every day
- Our galaxy alone has over 500 billion stars
  - Each of these stars has its own procession of planets
- Humans could never catalog these planets ourselves
- My goal is to create an algorithm that would help classify and group exoplanets based on their potential for future human colonization

Vision



- My idea is to train an algorithm using an unsupervised machine learning method
- It will cluster planets based on several key factors: temperature, mass, and distance (from us)
- I can estimate temperature based on variables like stellar flux & distance from host star
- Mass can be estimated via the transit method and star “wobble”
- Distance is a standard value

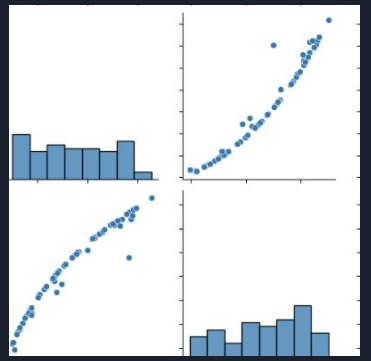
Impact

01 Build a 3D chart that illustrates potential habitability of many of our nearest neighbors - one that can scale with more data

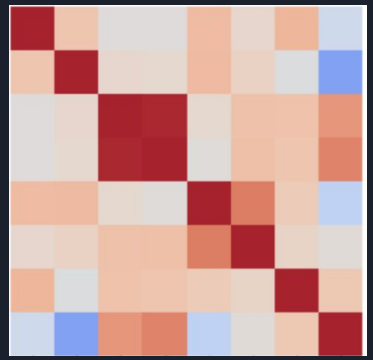
02 Build something that inspires people to dream about a beautiful tomorrow, so they can start caring about our home today

03 Something to talk to employers about so they think I’m cool and trendy so they want to hire me

Data



- I have several data sets that I am in the process of exploring - divided by method of detection
- In my primary dataset, I have identified several key variables that I have created a correlation heatmap for
- High level overview of correlated variables:
  - Strong correlation [0.97] between flux & surface temperature
  - Correlation [0.61] for surface temperature & overall habitability (ESI)
  - No correlation [-0.12] between mass and habitability
  - Distance/Mass & period - false flag correlation
- Other tests: pairplots, scatter matrix, boxplots



Next Steps

Initial Data Dive
Present Sprint 1

Identify problems, discuss potential solutions, determine what type of ML to use

Build & Train Model
Sprint 2

Build unsupervised clustering algorithm that can map an exoplanet to a colonization index on a 3D plane

Final Refinement
Final Presentation

Complete capstone, upload to LinkedIn, blog, github


Thank You