Motivation

The possibility of life existing on a planet orbiting another star is not just a plausible theory but it also has the advantage of the odds on its side. The fact that there are hundreds of billions of galaxies in the observable universe, with each galaxy containing some hundred billion stars; it seems almost ridiculous to suggest that Earth might be the only planet in the whole universe capable of supporting life.

The search for extrasolar planets has become a subject of intense scientific investigation over the years. The reason is simple. With a limited number of resources to sustain an ever-growing population, mother Earth definitely needs to be off-loaded to put it colloquially. Thus, the question of habitable exoplanets is important.

As of November 2019, a grand total of 4128 exoplanets had been identified with the use of several different methods of detection.

Various methods used in exoplanet analysis:

- Radial velocity: https://exoplanets.nasa.gov/alien-worlds/ways-to-find-a-planet/#/1
- Transit: https://exoplanets.nasa.gov/alien-worlds/ways-to-find-a-planet/#/2
- Direct imaging: https://exoplanets.nasa.gov/alien-worlds/ways-to-find-a-planet/#/3
- Gravitational microlensing: https://exoplanets.nasa.gov/alien-worlds/ways-to-find-a-planet/#/4
- Astrometry: https://exoplanets.nasa.gov/alien-worlds/ways-to-find-a-planet/#/5

Of all the methods used / being used for exoplanet research, the transit method continues to be the most popular method as of today. By making precise photometric measurements from the ground or in space and waiting and watching to detect the small tell-tale dip observed in the light curve when an exoplanet crosses its parent star, exoplanets can be found. Transit measurements allow the planet's size, orbital period and semi-major axis to be inferred. The planet size comes directly from the depth of the transit, it being the ratio of the planets area compared to that of its host star.

Kepler was a space telescope designed to survey a portion of the Milky Way galaxy in search of exoplanets, which are planets outside our solar system.

Using data from the Kepler mission and the extended K2 mission, scientists have identified more than 2,800 candidate exoplanets and have confirmed more than 2,600 of these as bona fide planets. A handful of planets are thought to be rocky like Earth, and orbit in the habitable zone of their stars, where liquid water - an essential ingredient of life as we know it - might exist!

After nine years in deep space collecting data that indicate our sky to be filled with billions of hidden planets, NASA's Kepler space telescope has run out of fuel needed for further science operations. Many of these planets could be promising places for life.

Incited by this domain of research and the Kepler mission in particular, we decided to pick exoplanets as the topic of our project with our source of data being the open-source dataset generated by NASA.

By the end of ten weeks, we hope to be able to tell a good story / share some insight with this data :)

References:
https://www.cfa.harvard.edu/~avanderb/kepler90i.pdf
https://ai.googleblog.com/2018/03/open-sourcing-hunt-for-exoplanets.html
https://exoplanets.nasa.gov/what-is-an-exoplanet/how-do-we-find-life/
https://www.pnas.org/content/111/35/12647
https://www.frontiersin.org/articles/10.3389/fspas.2020.00010/full