**PSPT Sunspots**

CU Boulder CSCI 7000 Semester Project

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**Project Overview**

Parts of the project pitch will be included in this section.

**Data Acquisition & Organization**

Will include:

Location of data on PSPT website

Downloading instructions

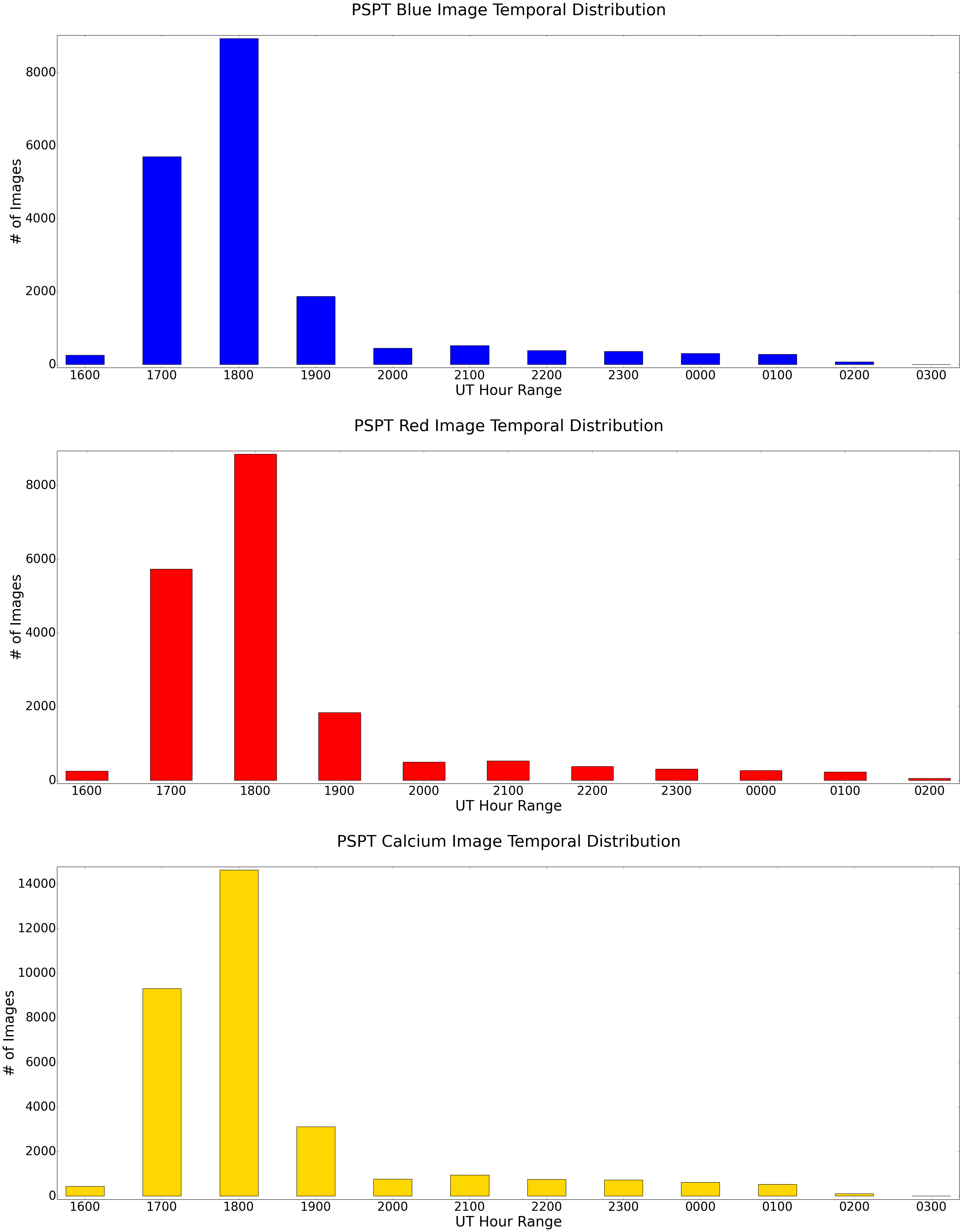
Explanation for sorting & trimming data.

$ ls year/month/day/filter/\*.HourHour\*jpg | wc –l

This command lists the number of filenames that start with the chosen .HourHour timestamp value.

I determined the number of images in each hourly bin from 1600-0300 hours UT time. For each filter, I made a bar graph showing the image distribution as a function of hourly bin. This graph is made by running pspt\_data.py:

$ python pspt\_data.py

The script produces the plot below.

For all 3 filters, 1800-1900 hours contains the most images. However, looking at the data, there are often multiple images in this hour range on any given day, taken minutes apart. Because the goal of the project is to track the sunspot frequency over long (decades) timescales, I decided to trim the data down to contain only 1 image per filter per day on the days for which there is data. This can be done using the commands below.

$ ls \*jpg > filter\_jpg\_all.txt

This command writes all filenames into a text file. Not all images can be listed at once because there are too many files. List by subgroup instead- e.g., 199\*, 200\*, 201\*. To list the images into a file that already exists:

$ ls \*jpg >> filter\_jpg\_all.txt

$ sort -u -k1,1.8 jpg.txt > filter\_jpg\_unique\_days.txt

This command compares first 8 characters (YearMonthDay substring0 of every line and list lines with unique YearMonthDay strings into a separate text file. Only the first unique occurrence is listed into the file.

$ find . -name "\*" | grep -vFf filter\_jpg\_unique\_days.txt | xargs rm -rf

This command deletes all files whose names are NOT in the file of the filenames with unique YearMonthDay strings.

The commands above are repeated for the FITS images for the same filter, then both the JPG and FITS sorting is done on the remaining filters.

After organizing by unique year, month and day, the following data remains:

3277 unique days of blue images

3267 unique days of red images

3362 unique days of calcium images