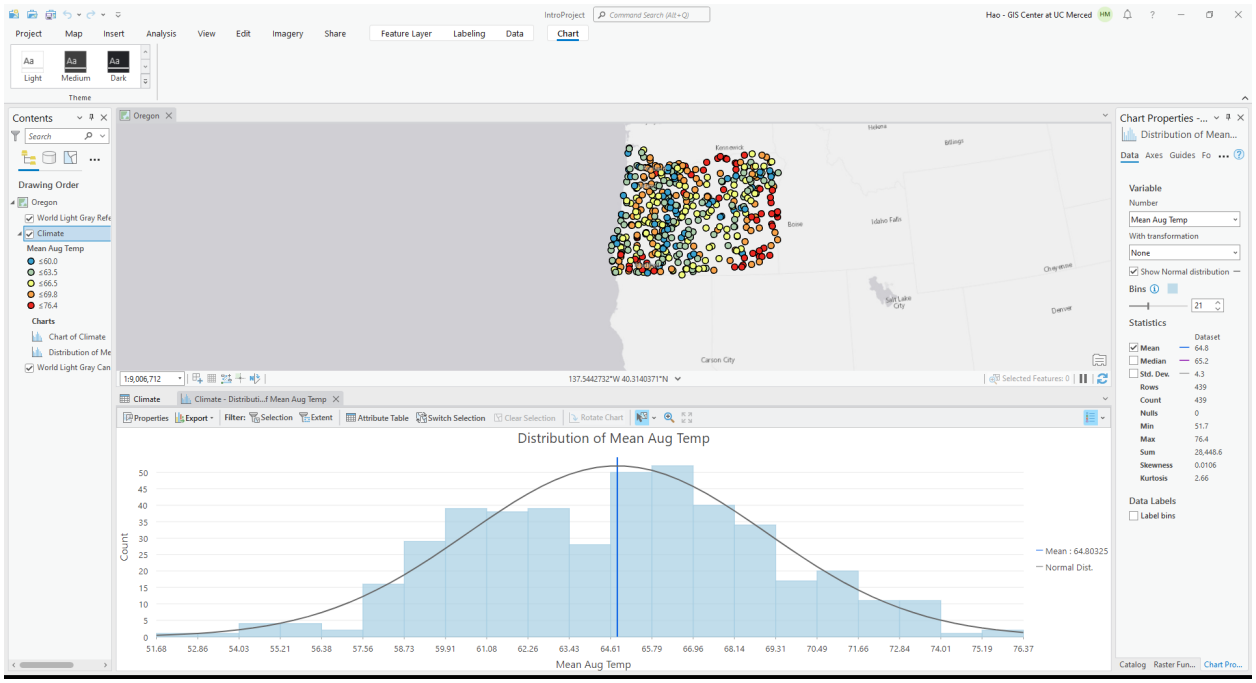
Hao D Mai
Engr 180
Professor Madeline Brown
Case Study 5

Case study: " Spatial Estimation"
Analysis and Application of Spatial Interpolation

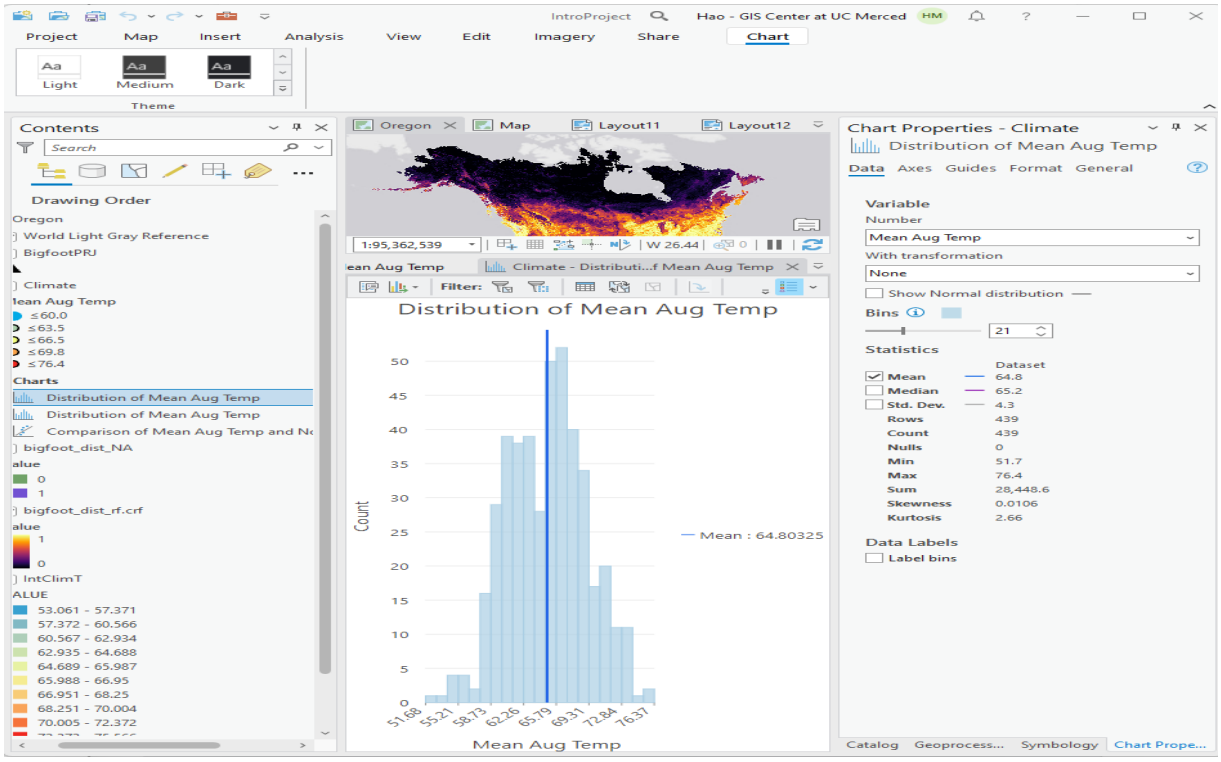
- **4.1 Answer responds: The data presented within the attribute table of the climate:** For this project we are given a headstart with a folder containing an '.aprx' of the climate data projection which contains vector data - points that identify temperature across Oregon. The subcategories to the base map 'Oregon' evidently is an exemplification of flat-file, raster - continuous based data. Raster data of this origin are composites of cell values suited for the projection of elements such as temperature, elevation, and flow state in which data values are compiled into a grid of cell's matrix grids within bounds of rows and columns. Each cell presents a specific value which contributes to the totality of the whole map projection; otherwise, elementally will serve no significance. Raster spatial operation which includes but is not limited to map algebra and neighboring to interpolate the direction of flow of maps, hence such is recalled as continuous data.Within the attribute table of climate, there exists 439 columns whis is also the number of sites within the data; furthermore, there are 23 rows of data - the sum of data values present is 10,097 total.
- **4.2 Screenshot of map chart created for the 'Mean Aug Temp' containing the mean, median, and normal distribution reference line:**



- **Data assessment for ‘Mean Aug Temp’ data distribution:**

The image displayed above depicts the import of Oregon's county climate data examined with a geostatistical analysis tool to interpret whether the data is normally distributed or not. More specifically, the examination procedure is known as the Kriging method - it will assess an integrated set of data by employing the statistical normal distribution means of analysis for the user to interpertate whether the data has a normal distribution. According to the image and the general principle of distribution analysis, the data projected seems to have normal distribution due to the fact that it follows the bell curvature shape.

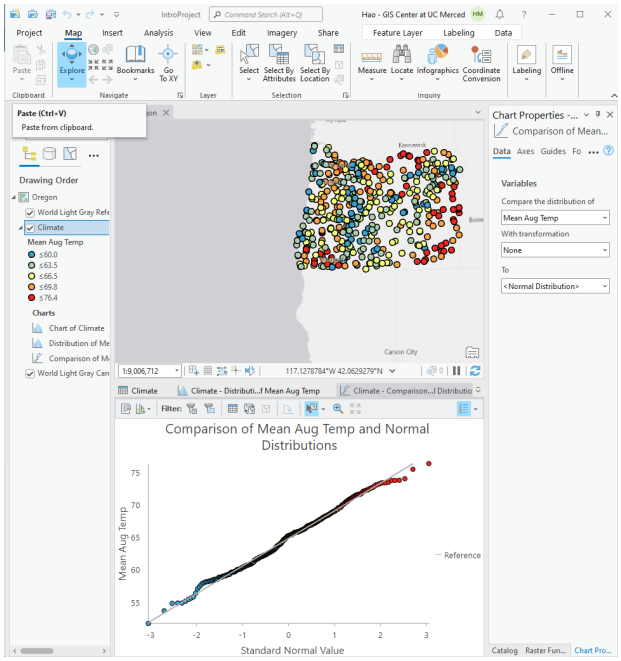
- **4.3 Screenshot of statistical/numerical result:**



- **Response for assessment of statistical/numerical data distribution:**

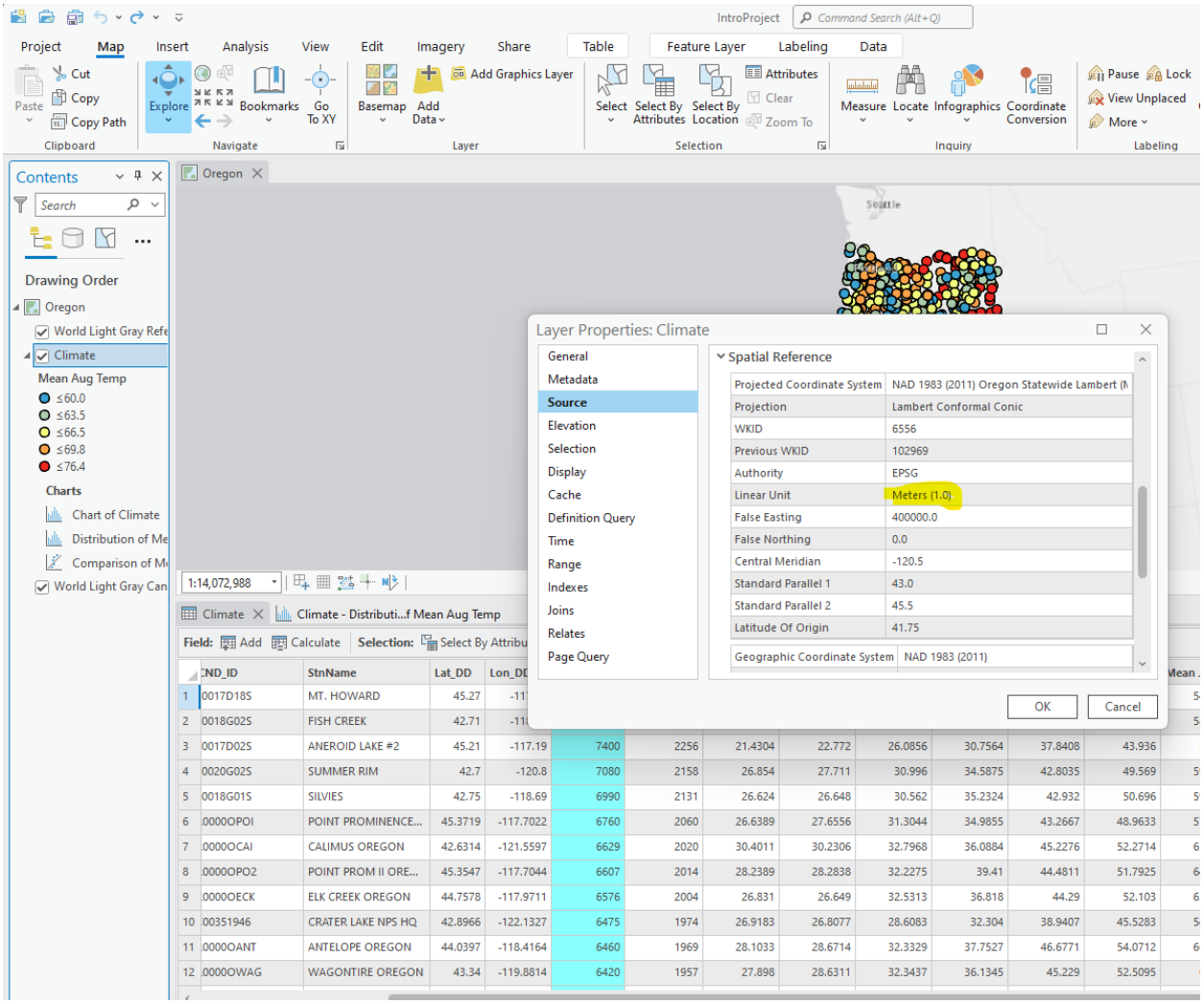
From the output data, the summarization of statistical analysis for ‘Mean Aug Temp’ shows to be normally distributed for the fact that it follows the bell curve principle of the Kriging method. Normal data distribution is not mandatory for importing and usage of data within ArcGis; however, normal data distribution aids in the process of precisely transforming sets of data into a desired projection - the more optimize the data is resembling the bell curve shape, the more concise the map’s transformation and composition will be making the deliver product detailed with minimal percentage of error.

- **5a Base on visual projection of 'Mean Aug Temp', assess the data output and decide whether the data will need to be transformed:**



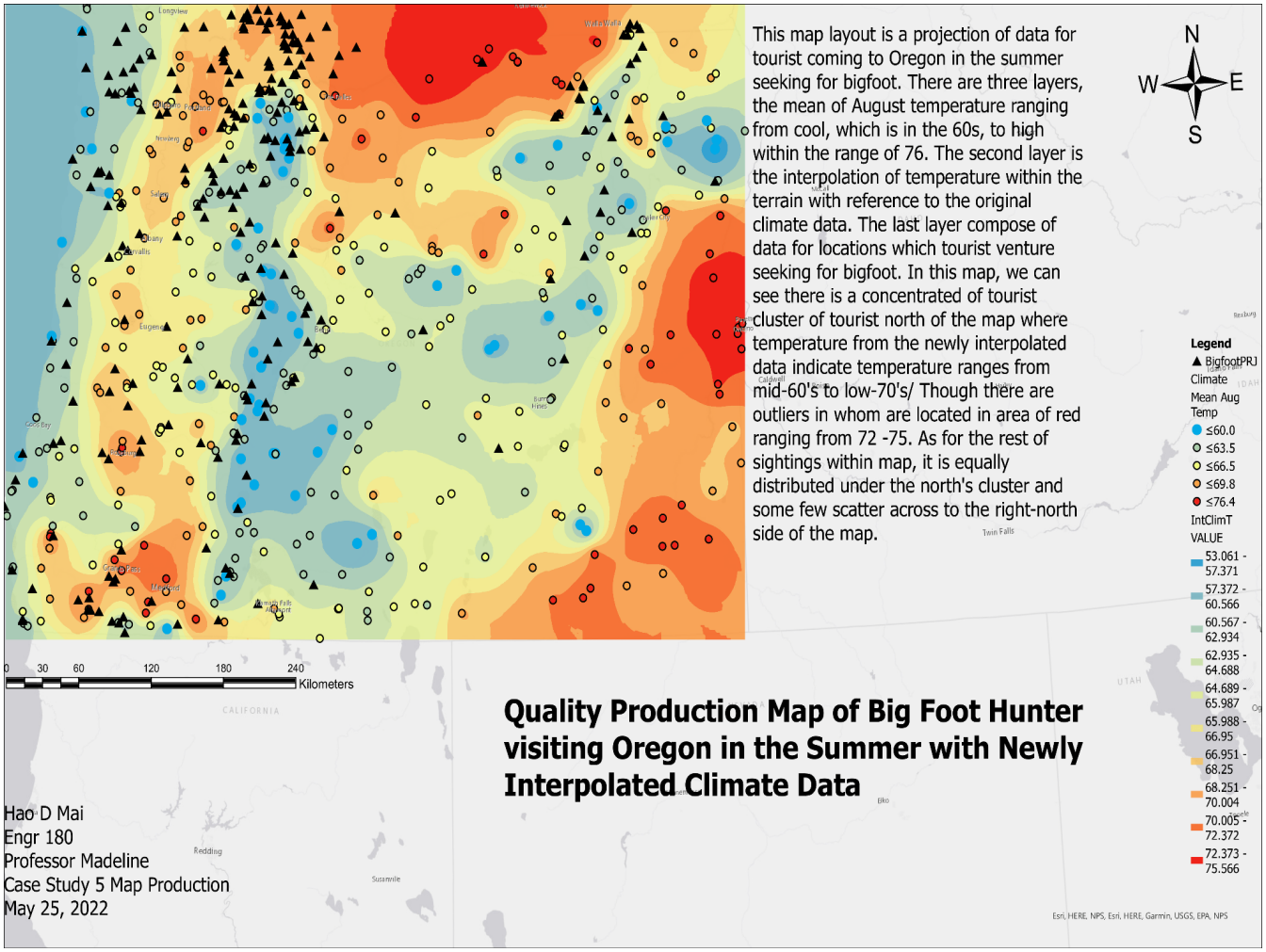
The practice of using histogram and QQ-plot is another method of analyzing and determining whether an integrated set of data is normally distributed or not. There exists a 45 degree reference line which the data can be used as reference to be plotted along. If the data follows the curve then it is conclusively normally distributed, but if the data plots diverge from the 45 degree reference line then it is not distributed normally - the transformation project may lack precision and contain a large margin of error.

- **5b Screenshot of spatial reference of layer highlighted or circled metric unit:**



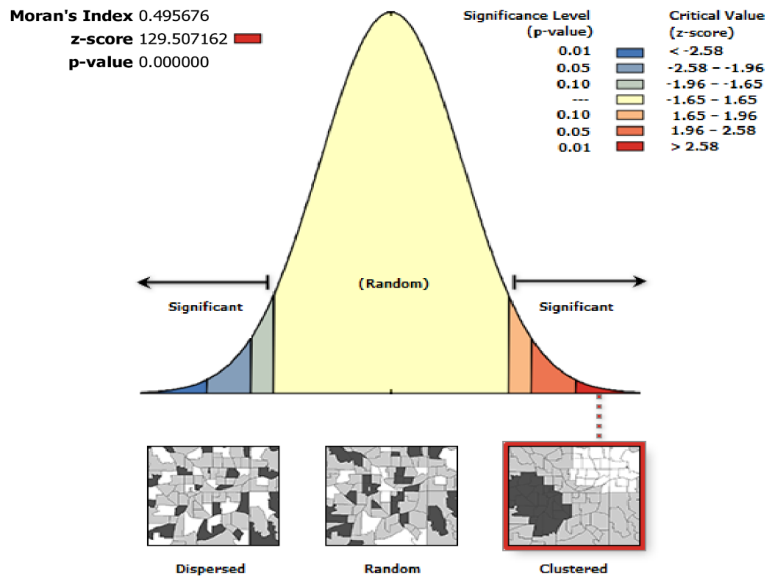
	ND_ID	StnName	Lat_DD	Lon_DD								
1	0017D18S	MT. HOWARD	45.27	-11								
2	0018G02S	FISH CREEK	42.71	-11								
3	0017D02S	ANEROID LAKE #2	45.21	-117.19	7400	2256	21.4304	22.772	26.0856	30.7564	37.8408	43.936
4	0020G02S	SUMMER RIM	42.7	-120.8	7080	2158	26.854	27.711	30.996	34.5875	42.8035	49.569
5	0018G01S	SILVIES	42.75	-118.69	6990	2131	26.624	26.648	30.562	35.2324	42.932	50.696
6	0000OPOI	POINT PROMINENCE...	45.3719	-117.7022	6760	2060	26.6389	27.6556	31.3044	34.9855	43.2667	48.9633
7	0000OCAI	CALIMUS OREGON	42.6314	-121.5597	6629	2020	30.4011	30.2306	32.7968	36.0884	45.2276	52.2714
8	0000OPO2	POINT PROM II ORE...	45.3547	-117.7044	6607	2014	28.2389	28.2838	32.2275	39.41	44.4811	51.7925
9	0000OECK	ELK CREEK OREGON	44.7578	-117.9711	6576	2004	26.831	26.649	32.5313	36.818	44.29	52.103
10	00351946	CRATER LAKE NPS HQ	42.8966	-122.1327	6475	1974	26.9183	26.8077	28.6083	32.304	38.9407	45.5283
11	0000OANT	ANTELOPE OREGON	44.0397	-118.4164	6460	1969	28.1033	28.6714	32.3329	37.7527	46.6771	54.0712
12	0000OWAG	WAGONTIRE OREGON	43.34	-119.8814	6420	1957	27.898	28.6311	32.3437	36.1345	45.229	52.5095

6 Quality production map of interpolated data accompanied with explanation textbox:



- **7.4 Screenshot of Spatial Autocorrelation:**

Spatial Autocorrelation Report



Given the z-score of 129.507162, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

Global Moran's I Summary

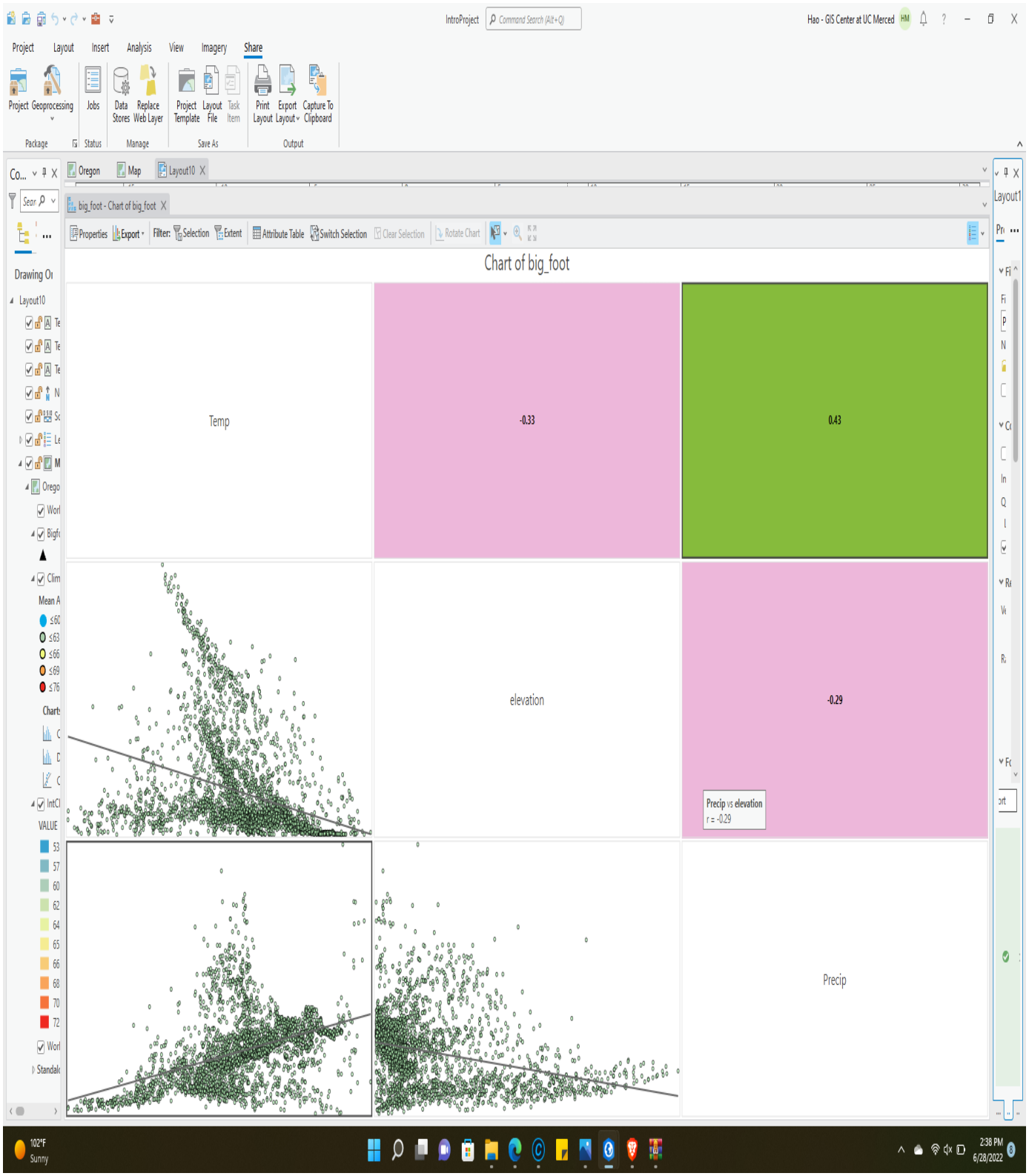
Moran's Index	0.495676
Expected Index	-0.000291
Variance	0.000015
z-score	129.507162
p-value	0.000000

Dataset Information

Input Feature Class:	big_foot
Input Field:	PRESENCE
Conceptualization:	INVERSE_DISTANCE
Distance Method:	EUCLIDEAN

Row Standardization:	True
Distance Threshold:	771853.6975 Meters
Weights Matrix File:	None
Selection Set:	False

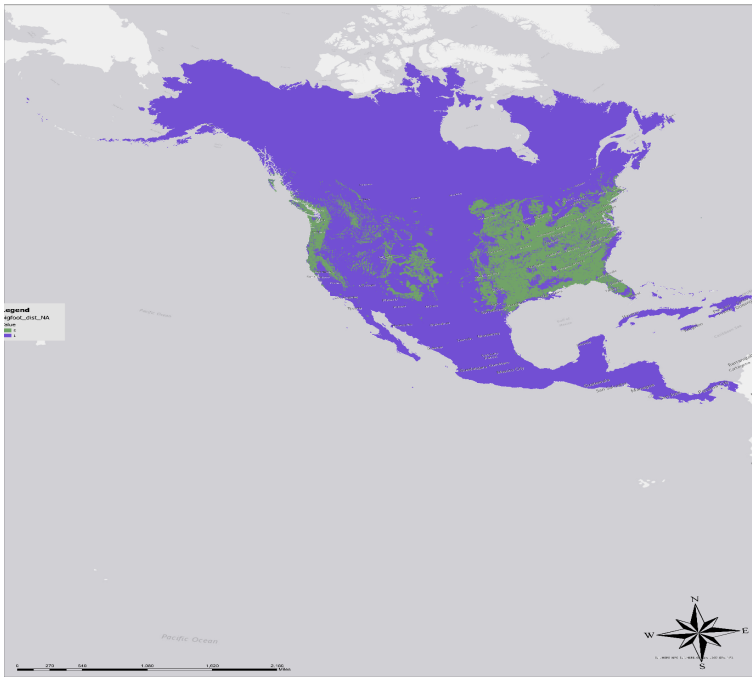
- **7.5 Screenshot of Plot Matrix:**



12 Production quality map with two frames submitted in one sheet along with answer response:

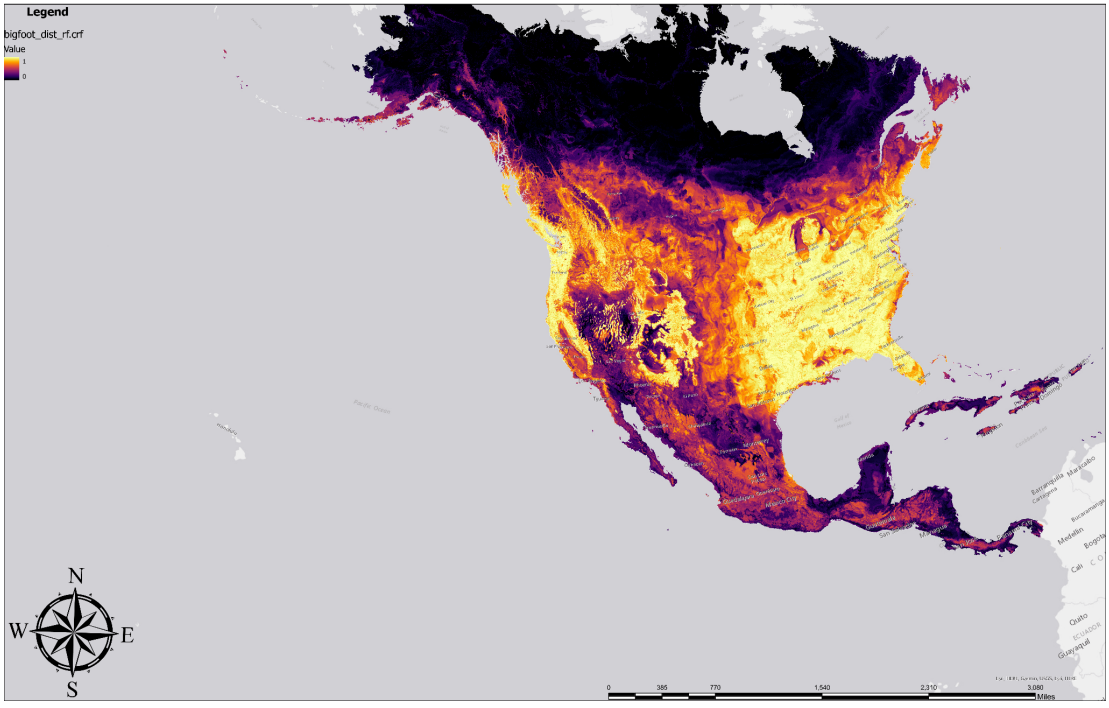
Raster Prediction of Bigfoot Distribution in Corresponds to Temperature and Elevation

Hao D Mai
Engr 180
Professor Madeline
Case Study 5
May 25, 2022



Raster Prediction Interpretation of Bigfoot Distribution in Corresponds to Temperature and Elevation

Hao D Mai
Engr 180
Professor Madeline
Case Study 5
May 25, 2022



Production Quality Map Write-up

a. I suggest individuals who are looking for bigfoot in Oregon during the summer season would have a higher chance of confronting a bigfoot in the central region of the state. Ergo, within the raster prediction map and raster prediction interpretation quality map production shows the region in which bigfoot are most likely to show up - within the bright yellow or green coloring scheme of the two maps.
b. I feel as if the model that was produced with reference to the materials that I was reading is an introduction; which is a simple but accurate exemplification for the practice of using raster prediction to infer the likelihood of an event occurring.
c. The distribution above shows extensive coverage with a small-scale projection of the state of Oregon. I believe that using the raster data prediction by interpolating census data as seen above may likely be a good start to identify areas which increase the likelihood of an encounter.

    I. I believe that bigfoot may be confused with large black bears, for these creatures are notorious predators in this region. Furthermore, during times of shock, the human visual center will take in partial information and falsely incorporate it as something else which is the reason for many false reports of cryptids.

d. There are many reasons for the event of error when interpolating data as practiced within this lab. One factor which I believe majorly contributes to error is the common electromagnetic interference that derives from the conveniences that run the world; from this aspect, radio waves from earplane, cellular towers frequencies and space satellite signals may all distribute how GPS generates geolocation coordinates. Thereby, when frequency pollution from our invention is inferred with GPS radio wave signals, this will create error percentage to tenth of thousandth error decimal point. Though miniscule, based on the scale of GPS projection this will create mismatch in locations, and therefore, imprecise data.
e. My biggest take away from this lab has taught me the value of data that bids to the principle of normal distribution for the most concise analysis and projection of data. This lab has also brought forth lectures that I have inquired from the class Probability and Static in which normal distribution is also a topic to study the likelihood of something happening given multiple trials represented by a bell curve. Through different study subjects, the concept of employing normally distributed data is the theme that stands out to me as most significant.

Work Citation:

- “Point, Line, and Polygon Styles: Documentation: Arcgis Developers.” *Documentation | ArcGIS Developers*, https://developers.arcgis.com/documentation/mapping-apis-and-services/visualization/point-line-and-polygon-styles/.
- “Use Symbology Histograms.” *Use Symbology Histograms-ArcGIS Pro | Documentation*, https://pro.arcgis.com/en/pro-app/latest/help/mapping/layer-properties/histograms.htm#:~:text=In%20ArcGIS%20Pro%2C%20the%20Symbology%20pane%27s%20histogram%20visualizes,show%20outlying%20or%20prominent%20features%20on%20your%20map.
- “Predict Using Trend Raster (Image Analyst).” *Predict Using Trend Raster (Image Analyst)-ArcGIS Pro | Documentation*, https://pro.arcgis.com/en/pro-app/latest/tool-reference/image-analyst/predict-using-trend-raster.htm.
-