

Home Work # 3

Submitted by: Zeeshan Ahmad

Submitted to: Professor Viviana Vladutescu

EET-3132 Remote Sensing

Chapter # 6

Q1: - This image of San Diego Harbor (Fig. 6.16) was taken on February 7, 2000 by the IKONOS satellite. What can you tell about the two ships? The carrier is 315-m long. What can you tell about the other ship?



Figure 6.16 San Diego Harbor, IKONOS image, February 7, 2000.⁶

ANS: - Carrier (on the right) is larger than the other ship (on the left). If carrier is 315m long then the other ship is about 245.45m. We got this using correlation method on the figure 6.16. Also, both ships are nearly 100m apart from each other.

Q2: - How could you tell that a road or rail line was intended for missile transport?

ANS: - There are many factors where we can tell that a road or rail line was intended for missile transport. For example, by interpretation keys and the elements of recognition which are: shape, size, shadow, height, tone or color, pattern and site which is the relation between an object and its geographic location, and etc.

Q3: - For an otherwise uniform scene (Fig. 6.17), there is a target with higher DN. The variance is 5106.4. Calculate the standard deviation (σ). Estimate distance between the target and background, in units of σ .

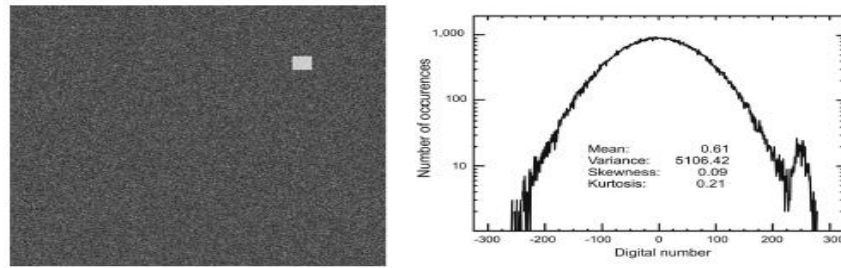


Figure 6.17 (a) Dark grey, cluttered background with bright target. (b) Histogram for DN occurrence.

ANS: - Variance = 5106.4, standard deviation = $\sigma = \sqrt{\text{Variance}} = \sqrt{5106.4} = 71.46$, mean = 0.61
Distance between target and background in $\sigma = \frac{\text{Location} - \text{mean}}{\sigma} = \frac{250 - 0.61}{71.46} = 3.49$. The target is more than 3 standard deviation from mean value which means that it lies in outliers.

Q4: - In Fig. 6.18, three regions are identified: water, a bright soil, and the old Moss Landing refinery site (red), with some very bright white sand and soil. Describe what dynamic ranges you would use to display the scene so as to enhance each region of interest. As an example, the best display for the soil would be to scale the data so that DN = 250 – 450 mapped to a digital display range of 0–255.

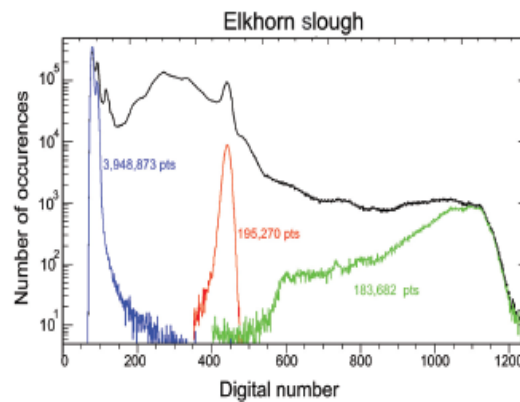


Figure 6.18 The Moss Landing Mineral Refractory was built ca. 1942. The white material may be dolomite from the Gabilan mountains, or magnesium residue from the material extracted from seawater.⁷

ANS: - Water (Blue) Digital Numbers = 60-350 in range of 0-1275 approximately. Also, DN for water would be 12-70 in range of 0-255 if we make the range 0-1275 equal to 0-255.
Moss landing refinery site (red) DN = 350-480 in range of 0-1275 and would be 70-96 if we mapped in range of 0-255. Soil (green) DN = 500-1275 and would be 100-255 if we mapped in range of 0-255.

Q5: - For a scene with 4 pixels, calculate the correlation between the pixels, and the covariance.

Pixel #	Red (DN)	Green (DN)	Blue (DN)
1	40	50	60
2	20	25	28
3	30	30	30
4	15	16	14

ANS: -

```
1 %Zeeshan Ahmad
2 %Prof.Viviana Vladutescu
3 %Home Work Problem chap 6.5/Page156
4 %EET 3132 Remote Sensing
5 p = [40 50 60; 20 25 28; 30 30 30; 15 16 14]
6 C = corrcoef(p) %Correlation
7 CV = cov(p) %Covariance
8
```

Command Window

p =

40	50	60
20	25	28
30	30	30
15	16	14

C =

1.0000	0.9693	0.9397
0.9693	1.0000	0.9949
0.9397	0.9949	1.0000

CV =

122.9167	154.5833	201.6667
154.5833	206.9167	277.0000
201.6667	277.0000	374.6667

fx >>