Assignment 1

Programming Exercise 1: Tableau Public

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1. Connecting data to Tableau

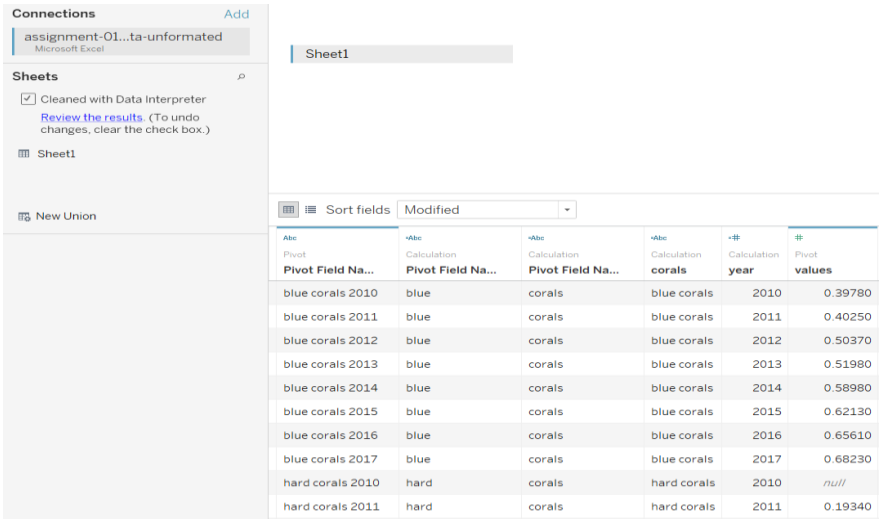
The data provided in file 'assignment-01-data-unformated.xlsx' was unformatted in the form as Figure 1.

			soft corals							
name	longitude	latitude	2017	2016	2015	2014	2013	2012	2011	2010
site01	143.515	-11.843	83.870%	80.210%	75.340%	74.990%	57.700%	56.430%	55.430%	56.290%
site02	147.898	18.937	21.230%	19.230%	17.210%	15.780%	14.800%			
site03	144.081	-10.321	75.340%	60.230%	37.210%	26.890%	25.890%			
site04	150.444	-20.414	12.450%	11.780%	11.340%	10.980%	10.890%	10.670%	10.230%	10.010%
site05	143.786	-13.107	94.230%	91.230%	76.230%	60.230%	30.230%	28.450%	29.130%	14.450%
site06	146.589	-17.981								
site07	145.043	-14.383	67.890%	60.780%	58.760%	56.450%	55.120%	40.120%	39.980%	40.340%
site08	145.715	-16.091	65.230%	63.210%	60.120%	60.030%	58.890%			

Figure 1 : Unformatted Data

2. Rearranging the data in desired format

I connected the file to Tableau Desktop and rearranged the data using 'Use Data Interpreter' option. I noticed that the data still is not in desired format to do visualisation activities. Hence, I used pivot option to format the data such that all coral-year and values columns change into rows. Further, I split the columns of coral-year and created new columns namely 'corals' and 'year' as in Figure 2.



Pivot Field Na...	Pivot Field Na...	Pivot Field Na...	corals	year	values
blue corals 2010	blue	corals	blue corals	2010	0.39780
blue corals 2011	blue	corals	blue corals	2011	0.40250
blue corals 2012	blue	corals	blue corals	2012	0.50370
blue corals 2013	blue	corals	blue corals	2013	0.51980
blue corals 2014	blue	corals	blue corals	2014	0.58980
blue corals 2015	blue	corals	blue corals	2015	0.62130
blue corals 2016	blue	corals	blue corals	2016	0.65610
blue corals 2017	blue	corals	blue corals	2017	0.68230
hard corals 2010	hard	corals	hard corals	2010	*null*
hard corals 2011	hard	corals	hard corals	2011	0.19340

Figure 2 : Splitting columns into desired number of columns

3. Data Visualisation and Fixing Errors

I plotted geographical map with the given latitude and longitude data and found all sites are locations along the Australian shore (Great Barrier Reef) except for site 2 location as in Figure 3. Here is our first error.

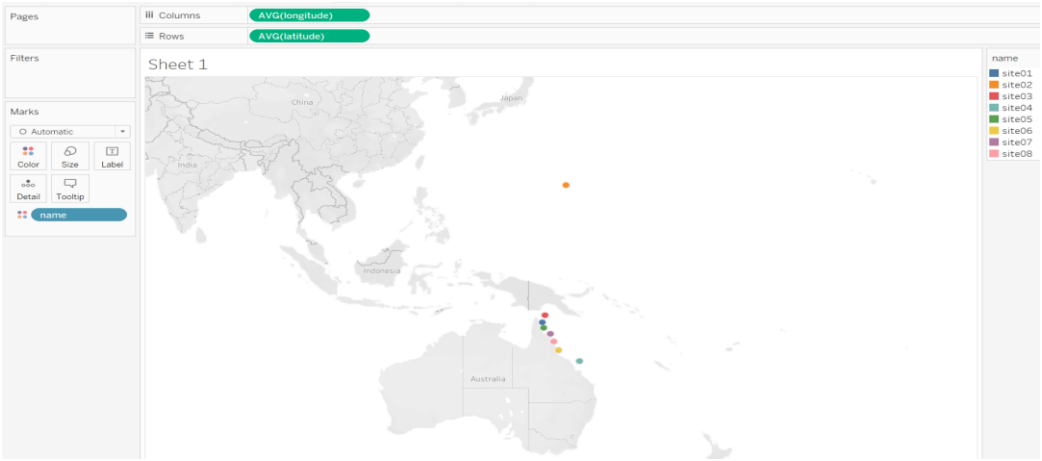


Figure 3 : Geographical plot (reformatted AUS coral data)

By looking at the data, I noticed that all other sites had negative latitude whereas site 2 had positive latitude. Since we can't update the source data manually in Tableau, to fix this, I created a calculated field 'updated latitude' with code as in Figure 4. It updates the positive latitude into negative latitude for site 2.

Figure 4 : Creating calculated field 'updated latitude'

Next, I observed the trend of average bleaching rate per coral per year. The general trend is that there is a gradual increase in the bleaching rate of corals over years but here, I noticed that there were a couple of discrepancies as in Figure 5.

Figure 5 : Overall Trend of Bleaching rate for corals

By looking into actual data and visualising for blue and hard coral, the discrepancies are as below:

a. Bleaching value for site 7 for year 2013 for blue corals was unusual as in Figure 6. Looking at the data, it seemed like a data entry issue. The bleaching rate was 0.004696 whereas other entries had values greater than 0.1.

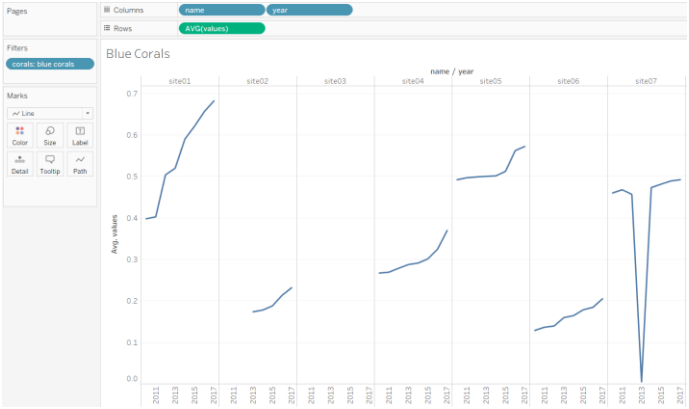


Figure 6 : Bleaching rate trend for blue corals

b. Bleaching value for site 8 for year 2014 for hard corals was unusual as in Figure 7. Looking at the data, it seemed like a data entry issue. The bleaching rate was 1.488 whereas other entries had values greater than 0.1 but less than 0.7.

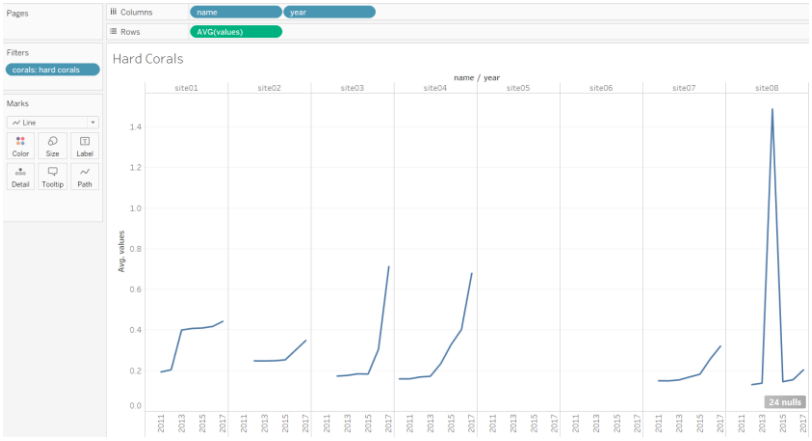


Figure 7 : Bleaching rate trend for hard corals

Although there was a variation of bleaching rate trend for sea pen coral, the data seemed correct. I corrected the above discrepancies by creating a calculated field 'updated value with code as in Figure 8. I've kept the null values untouched as I've assumed that the bleaching rate wasn't captured. Since, tableau, in its calculations, ignores null value upon applying filter, I did the visualisation activities accordingly.

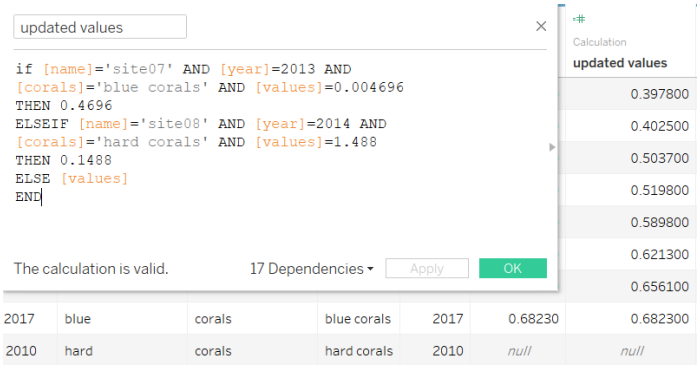


Figure 8 : Creating a calculated field to update bleaching values

4. Data Determination

Q1 **In which years and for which kinds of coral bleaching is the worst?**

ANS We can determine the answer by visualisation as in Figure 9, 10, 11 and 12.

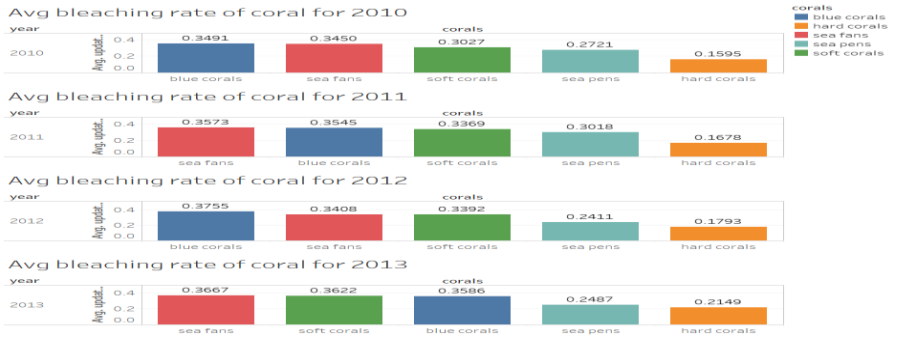


Figure 9 : Average bleaching rate value of corals for years 2011 to 2013

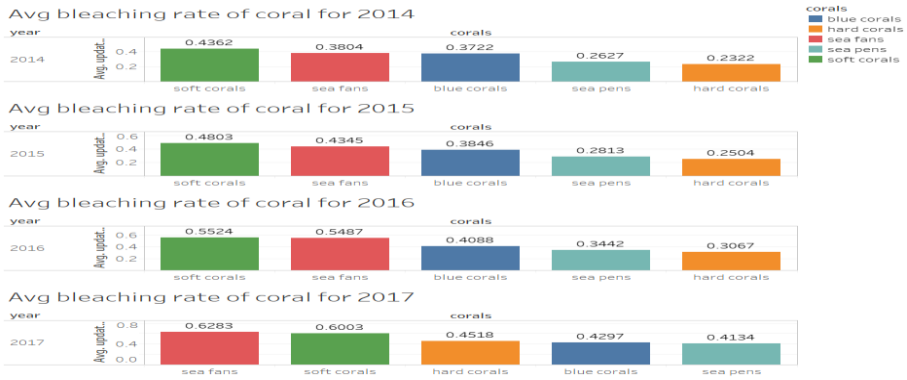
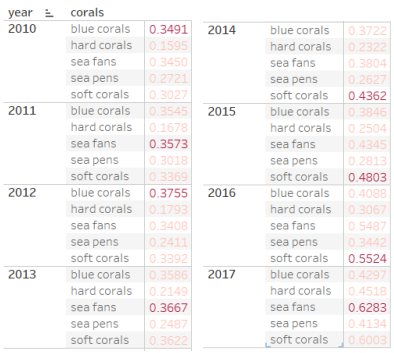


Figure 10 : Average bleaching rate value of corals for years 2014 to 2017



year	corals		year	corals	
2010	blue corals	0.3491	2014	blue corals	0.3722
	hard corals	0.1595		hard corals	0.2322
	sea fans	0.3450		sea fans	0.3804
	sea pens	0.2721		sea pens	0.2627
	soft corals	0.3027		soft corals	0.4362
2011	blue corals	0.3545	2015	blue corals	0.3846
	hard corals	0.1678		hard corals	0.2504
	sea fans	0.3573		sea fans	0.4345
	sea pens	0.3018		sea pens	0.2813
	soft corals	0.3369		soft corals	0.4803
2012	blue corals	0.3755	2016	blue corals	0.4088
	hard corals	0.1793		hard corals	0.3067
	sea fans	0.3408		sea fans	0.5487
	sea pens	0.2411		sea pens	0.3442
	soft corals	0.3392		soft corals	0.5524
2013	blue corals	0.3586	2017	blue corals	0.4297
	hard corals	0.2149		hard corals	0.4518
	sea fans	0.3667		sea fans	0.6283
	sea pens	0.2487		sea pens	0.4134
	soft corals	0.3622		soft corals	0.6003

Figure 11 : Average Worst Bleaching Rate of corals per year

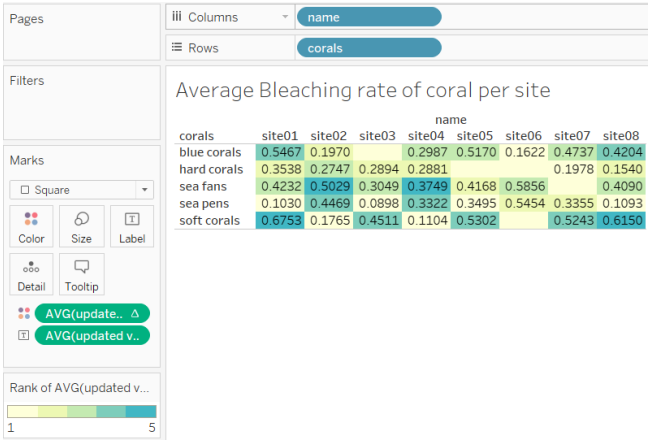
The first element in the graphs represents the coral with worst bleaching rate for that year whereas the table highlights the worst bleaching rate of a coral for that year. Below is the table for the same with required details.

Year	Coral Type with worst average bleaching rate	Average bleaching rate
2010	Blue Coral	0.3491
2011	Sea Fans	0.3573
2012	Blue Coral	0.3755
2013	Sea Fans	0.3667
2014	Soft Coral	0.4362
2015	Soft Coral	0.4803
2016	Soft Coral	0.5524
2017	Sea Fans	0.6283

Figure 12 : Table for worst average bleaching rate for coral per year

Q2 **How the location of the site affects bleaching on the different kinds of coral?**

ANS We can determine the answer by visualization as in Figure 13, 14, 15 and 16.



	name							
corals	site01	site02	site03	site04	site05	site06	site07	site08
blue corals	0.5467	0.1970		0.2987	0.5170	0.1622	0.4737	0.4204
hard corals	0.3538	0.2747	0.2894	0.2881			0.1978	0.1540
sea fans	0.4232	0.5029	0.3049	0.3749	0.4168	0.5856		0.4090
sea pens	0.1030	0.4469	0.0898	0.3322	0.3495	0.5454	0.3355	0.1093
soft corals	0.6753	0.1765	0.4511	0.1104	0.5302		0.5243	0.6150

Figure 13 : Average Bleaching rate of coral per site

The above figure shows how the site affects the average bleaching rate of different types of corals. The shade of the cell down the site column with bleaching rate implies the intensity – the lighter the shade, the lighter the impact whereas the darker the shade, heavier the impact.

Figure 14 : Average Bleaching Rate of coral per site 1-4

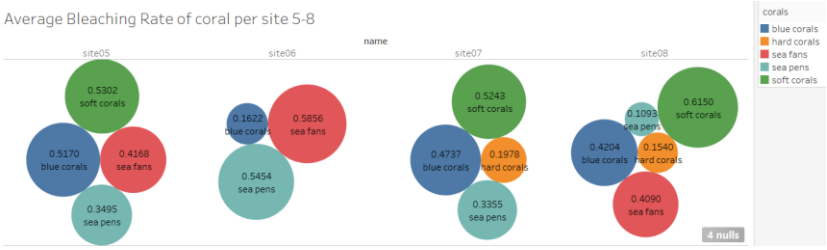


Figure 15 : Average Bleaching Rate of coral per site 5-8

In the above figure, the larger the size of the circle, the higher the average bleaching rate of the coral and the smaller the size of the circle, the lower the average bleaching rate of the coral. The size represents how a site impacts the average coral bleaching rate.

Site Name	Coral type ranking as per average bleaching rate (descreasing order)				
	1	2	3	4	5
site01	Soft Corals	Blue Corals	Sea Fans	Hard Corals	Sea Pens
site02	Sea Fans	Sea Pens	Hard Corals	Blue Corals	Soft Corals
site03	Soft Corals	Sea Fans	Hard Corals	Sea Pens	NA
site04	Sea Fans	Sea Pens	Blue Corals	Hard Corals	Soft Corals
site05	Soft Corals	Blue Corals	Sea Fans	Sea Pens	NA
site06	Sea Fans	Sea Pens	Blue Corals	NA	NA
site07	Soft Corals	Blue Corals	Sea Pens	Hard Corals	NA
site08	Soft Corals	Blue Corals	Sea Fans	Hard Corals	Sea Pens

Figure 16 : Coral type ranking as per avg bleaching rate per site

The above graphs and tables show how a site affects the average bleaching rate of a coral. Figure 16, in specific, shows coral type ranking per site based on average bleaching rate in descending order.