Lab 1: Collection and Analysis of the Avian Data

AIM:

To collect the information of birds spotted in the area nearby to the student's place in a systematic manner for two and a half months and analyse the obtained data to check for temporal variations.

INTRODUCTION:

Birds are a group of warm-blooded vertebrates constituting the class Aves, characterised by feathers, toothless beaked jaws, the laying of hard-shelled eggs, a high metabolic rate, a four-chambered heart, and a strong yet lightweight skeleton. There's a great variety of birds that can be found around us. Birdwatching, or birding, is a form of wildlife observation in which the observation of birds is a recreational activity or citizen science. The following study attempts to give a brief account of bird data recorded for 2 and a half months of birding in the region of study.
Region of study: Various places in Sindhudurg, Maharashtra, India.

METHOD:

A: Birding:

Field Guide: A book designed to help the reader identify wildlife (in this case, Birds), region-wise.
Field Notebook: A record maintained by the birder to note down important details duing birding.

Important points to note in the field notebook while birding:
1. When: Date, Start Time and End Time of birding, the Weather between start and end time.
2. What: Name of the Bird (For identifying: Size, in comparison to some other well-known bird; Nature of the beak and the feet; Color of the bird.). Also note how many birds of same species were spotted at one time.

To identify the parts of the bird correctly:
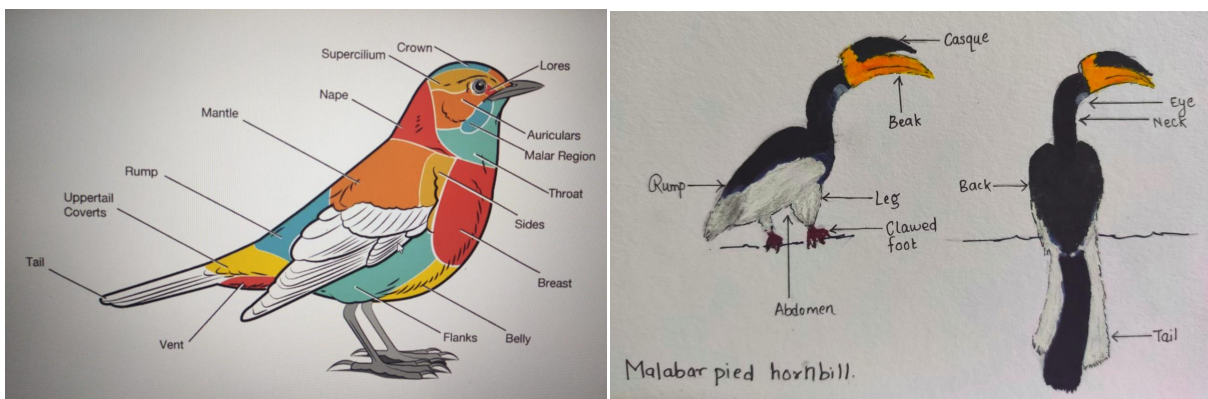
Mobile app named Merlin was used to help identify birds from their pictures.

B. Data Entering:
1. Data was systematically entered month-wise in the template.
2. Following information was filled in for each sighting of bird: Name of the student, Roll Number, Location, Date, Time, Weather, Bird Name, Number of birds and Behaviour, Identification Traits (Picture/Recording of call of the bird, optional).

C. Data Analysis:
For the temporal analysis, I chose three ways:

1. Plotting Temporal Variation and Species Accumulation Curve:
The data of 12 weeks was plotted as number of species spotted per week (for each 7 days) in plot for Temporal Variation, whereas the cumulative number of species spotted for all the weeks was plotted in Species Accumulation Curve.

2. Study of temporal variation in the occurrence of certain specific species:
The data of 12 weeks was checked for certain birds which were spotted only in certain specific period in the duration of study. These birds were sorted and listed out separately along with the time of study duration in which they were exclusively spotted.

3. C. Calculation of the Shanon-Wiener Index of the data:
Calculation and comparison of the SW Index and evenness of the data can give an idea of diversity and evenness of respective data sets.
To calculate S-W Index,

$$H = -\sum p_i ln(p_i)$$

where, p_i is the proportional abundance of species i.

Diversity: a measure of heterogeneity or unpredictability of the data. In terms of bird data, more value of diversity (given by the SW Index, H) denotes that there's higher variation between the type of species found in that particular area, and vice versa.
Evenness: it gives the quantitative measure of distribution of individuals per species. This number can take some value between 0 and 1. In terms of bird data, the more the evenness index, the more evenly spread is the abundance of each species in the data set. Less value of evenness implies that the data is skewed, i.e., a small proportion of total species in the data have very large/small number of birds compared to other species forming major part of the data.

RESULTS:

Results of Birding and Data Entering part of the procedure have been submitted in the collective data sheet of class.
Results of Data Analysis:
1. Plot of Temporal Variation and Species Accumulation Curve:
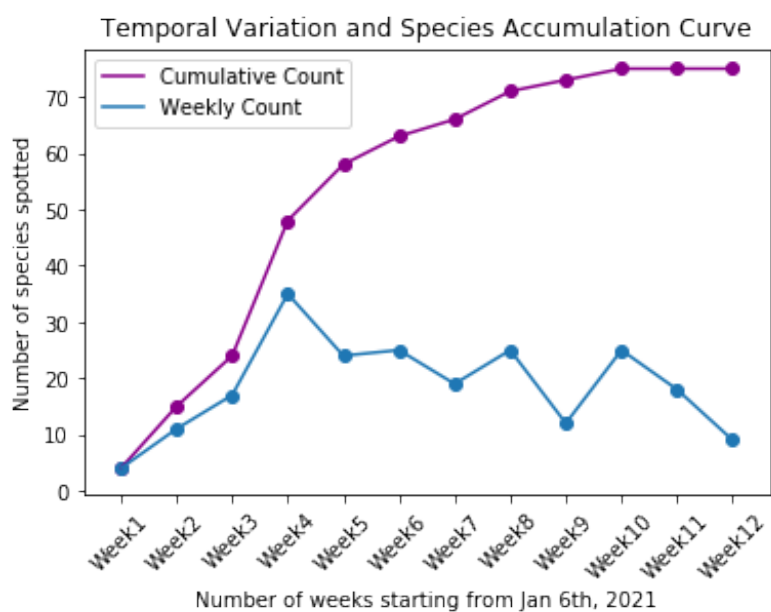
The total number of species spotted in the duration of study = 75.

2. Study of temporal variation in the occurrence of certain specific species:

The list of birds spotted only during certain weeks of duration of study along with the week number in which they were spotted:

Bird Species	Was spotted in week number
Golden-fronted Leafbird	2, 3
Indian Golden Oriole	3
Black-headed Cuckooshrike	4, 10
Orange-headed Thrush	5
Black-hooded Oriole	5
Rufous Treepie	5, 6
Indian Pitta	7, 8
Chestnut tailed Starling	7
Purple rumped Sunbird	10, 11
Spotted Dove	10, 12

Some species, like Chestnut-tailed starling, Asian Emerald Dove and Tickell's Blue Flycatcher were spotted just once during the whole duration of study. The possible reasons for these variations are discussed in detail in the inferences.

3. Calculation of the Shanon-Wiener Index of the data:
Calculated values for the dataset under consideration:
H = 3.469385171987918
Evenness = 0.806071724488053

INFERENCES:

1. From the plot of Temporal Variation, it can be inferred that there is noticeable variation between number of species spotted in different weeks. This can be attributed to different factors like, variation in the amount of time dedicated to birding per week, variation in the avian diversity at different birding spots, weather, etc.)

2. From the plot of Species Accumulation Curve, it can be seen that, as the time progresses, the number of newly spotted birds decreases gradually. In the last few weeks, cumulative number of species spotted is seen to reach a constant value of 75 species.
   However, this also depends on the factors mentioned in point 1 above, so, we cannot draw any firm conclusion from the two curves.

3. The table denoting the time of occurrence of certain birds in the area under study give some interesting information. Some birds are seen to be common throughout the course of study, whereas some birds were spotted only during a specific time. The reasons for the occurrence of certain birds in certain time of month could be majorly associated to the blooming of specific species of flowering plants which attract these species of birds. The Golden-fronted Leafbird (Chiku (Sapodilla) flowers), Chestnut-tailed Starling (Water Apple or Silk Cotton Flowers), Purple-rumped Sunbird (Drumstick Inflorescence) are some of the birds that were spotted during the flowering season of the respective plants. The reason is not the same for Rufous Treepie, Indian Pitta and Orange-headed Thrush as per the observations since they were never spotted nearby flowers of any plant species. For Indian Golden Oriole and Black-hooded Oriole, possibility is that their spotting during only certain weeks is because they prefer shady places deep inside the tree canopies and come in the open less frequently. Reasons for variation in Spotted Dove's occurrence could not be figured out.

4. Some species, like Chestnut-tailed starling, Asian Emerald Dove and Tickell's Blue Flycatcher were spotted just once and could be considered as difficult to be found species in the area of study. The Greater-Racket tailed Drongos were only spotted during the the days when weather is foggy and cloudy, this can be considered as a type of seasonal variation.

5. We cannot draw any conclusion from the value of H for only this data set. To be able to conclude something about relative diversity, we'll also need H values of data sets from other locations.
   The high value of evenness concludes that the abundance of different species in the area under study does not vary by large amount.

[The results of spatial analysis that we performed on whole class's data can be found: here]