

Assignment 2 : Population Density Estimation

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Introduction

Why did we decide to study millipede?

Rituraj: It all started with a casual evening stroll after a cafeteria visit when I spotted a Yellow-Spotted Millipede near the SBS building, just minding its own business, crawling along the pavement. Naturally, I poked it with my trusty stick "Aegis" to see what would happen (because, why not?). The little guy, whom I promptly named Deoy, curled into a tight ball, and a weird smell started wafting up. Was it coconut oil? Was it dead leaves? Opinions varied, **as described in my first assignment.** That little encounter piqued my curiosity about these millipedes, and now, for the second assignment, it's time to go beyond just poking them.

Gayathri: For my first assignment, I focused on the grooming behavior of domestic cats, which gave me valuable insights into behavioral observation and new information on why cats do what they do. However, on reading through a number of methods for population density estimation, I decided to change gears with this project and learn about something different, something **smaller and abundant on our campus.** I also **wanted a wider field of study** for this assignment. Hence, partnering with Rituraj, we decided to investigate the Yellow-Spotted Millipede. They have a noticeable presence around campus and are easy to observe, thus being the perfect subject for this assignment.

Armed once again with "Aegis", we set out on our mission to uncover how many of Deoy's relatives were hanging out along the footpath from the SCS building to the SHHS building. This route offered a diverse mix of environments—leafy patches, open spaces, and the occasional distraction. Our objective was clear: track down the millipedes, pinpoint their favorite hangouts, and, hopefully, avoid any further debates about their mysterious scent this time around.

Species and Sampling Methodology

Species Studied: Yellow-spotted millipede (*Harpaphe haydeniana*)

Transect Sampling

The transect method is a widely used technique for estimating population density and studying species distribution. It involves observing and recording the presence of organisms along a pre-determined line (line transect) or from a fixed point (point transect). In line transect sampling, the observer travels along the line and measures the perpendicular distance from the line to each detected individual or group. In point transect sampling, the observer records the radial distance from a fixed point to the detected organisms. Both methods allow for systematic sampling over a defined area and are particularly useful for studying mobile or spread-out species across various terrains.

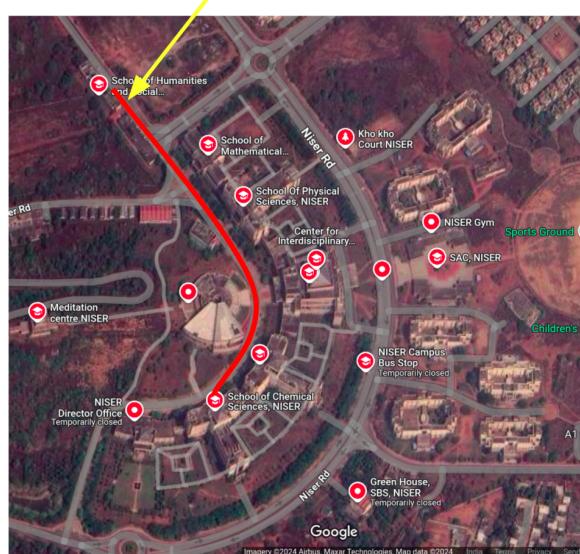
Why Transect Sampling?

Transect sampling is ideal for the Yellow-Spotted Millipede because these creatures tend to move along specific pathways, often near leaf litter and shaded areas, making them easier to spot on a pre-determined route. The method works well for ground-dwelling species, allowing us to systematically cover a defined area and get a decent estimate of their population density. Plus, the flexibility of this method suits our campus terrain, which is a mix of footpaths and natural spaces. The slightly curved nature of our transect also aligns with the millipedes' own non-linear movements.

Our Transect Line:

Our transect line followed the footpath from the SCS building to the SHHS building, passing by the SBS, LHS, SPS, and SMS buildings. While we aimed for a straight line, the natural layout of the campus introduced a slight curve. However, this curve was minor enough that it didn't affect the overall sampling accuracy. The millipedes, after all, don't travel in straight lines either!

Transect line



Note:- Our transect line, while not perfectly straight, can be almost assumed to be so. The path we followed from the SCS building to the HHS building had a very slight curve . We did our best to keep the route as direct as possible, but this gentle curve doesn't stray far from what could be considered a straight line.

Methodology

Transect Setup:

We measured a transect line of approximately 400 meters (estimated using our footsteps and google-maps, since we didn't have measuring tape). We walked this route, scanning both sides of the path within a 2-meter wide strip. Our goal was to count how many millipedes we encountered along this footpath.

Data Collection Process:

We conducted our survey during the late afternoon when the millipedes are most active. Each time we spotted a Yellow-Spotted Millipede, we recorded its location and ensured we didn't count the same individual twice. Given that we lacked more advanced tools, we used natural landmarks to estimate distance and make the process as accurate as possible.

Results

After an afternoon of intense millipede-spotting, we recorded **43** **Yellow-Spotted Millipedes** along our 400-meter transect. Here's a breakdown of where we found them:

Location	Number of Deoy's relatives
SCS to SBS	4
SBS to LHS	5
LHS to SPS	10
SPS to SMS	3
SMS to SHSS	21

Math Time!

The area we sampled was the transect length multiplied by the width:

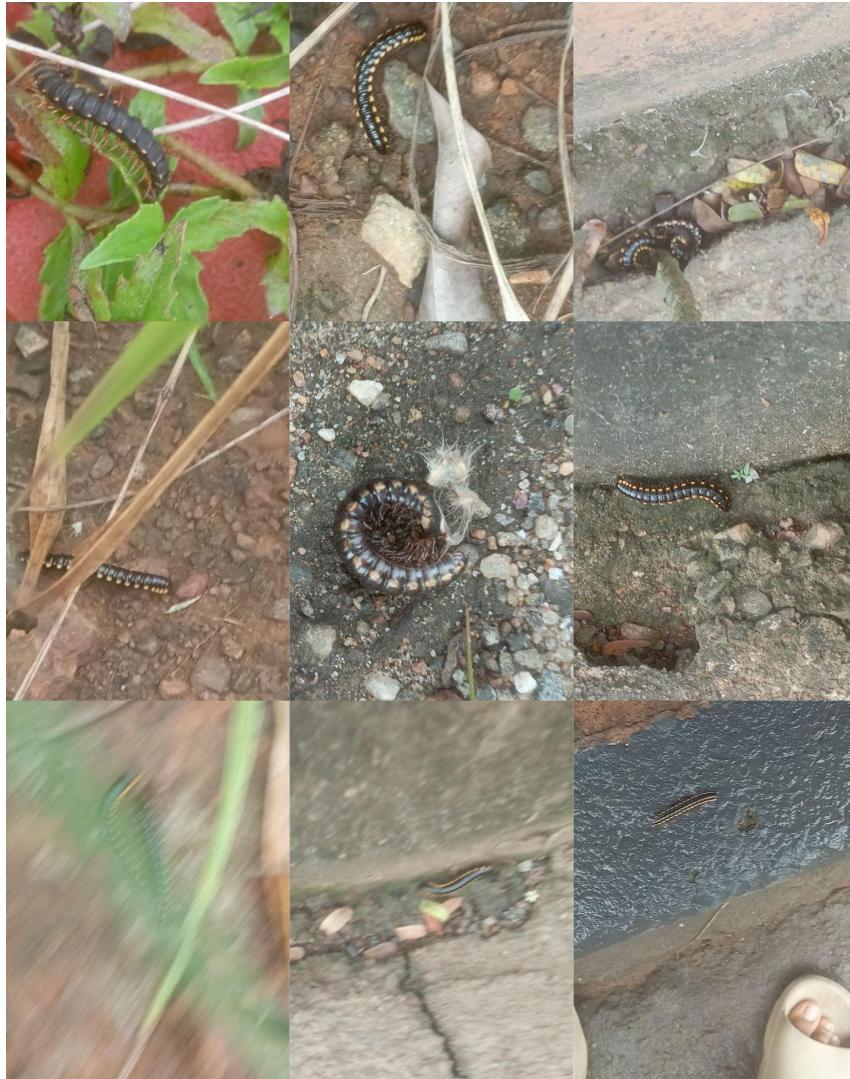
$$\text{Transect Area} = \text{Length} \times \text{Width} = 400 \text{ meters} \times 2 \text{ meters} = 800 \text{ square meters}$$

Now, to calculate the population density of the millipedes:

Population Density = Number of Millipedes Spotted ÷ Total Transect Area

$$\text{Population Density} = 43 \div 800$$

So, based on our observations, the estimated population density of Yellow-Spotted Millipedes is **0.05375 millipedes per square meter.**







Conclusion

Our transect sampling revealed that the Yellow-Spotted Millipedes are more commonly found in areas with shade and moisture . These conditions provide the ideal environment for them, which explains their higher density in those spots. In more open and dry areas, we observed fewer millipedes. Overall, this study highlighted how important specific environmental factors like moisture and shade are for the distribution of millipedes on campus.

