Python in GIS

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15/06/2020

1 Research question(RQ) and sub-questions

To what extent does the behaviour of owls in urban environments differ from that in rural areas?

- How do nocturnal activities differ in both categories ?

- To what extent does the hunting radius differ ?

- How do hunting times differ in both categories ?

2 Methodology

In this research, we will work with QGIS.

2.1 Pre-processing of the data-set

First, all owls need to be categorised in either rural or urban owls. Since there is no strict definition of when an owl is considered to be habituated in an urban or rural environment each owl needs to be assessed individually. Criteria for the selection would be:

- Proximity of owl paths to settlements

- Existence of traffic near the owls habitat

- Other sources of noise or light pollution caused by humans / human infrastructure

In a study by Evans et. al. [1] behavioural syndromes in rural and urban populations of song sparrows was analysed. For this, the authors examined three sites. Each site is categorised to be either rural or urban. This categorisation is also done individually by the authors with no set parameters. Similar observations can be made with other studies which discuss differences in urban and rural populations [2].

2.2 Analyse behavioural differences

Next the analysis of the behavioural differences follows. This includes the assessment of all necessary parameters needed in order to answer the RQ and the sub-questions. Through the usage of the provided data sets, the following parameters will be identified for each owl.

1. Start and End of nocturnal activity time

2. Duration of nocturnal activity

3. Area of hunting ground

Judging from an initial research the observed owls(Bubo Bubo) rest at day while hunting at night - typically after dawn [1]. This knowledge along with the movement data of the owls can help to detect times where the specimen is hunting, as movement that is recorded throughout the day will most likely not result from hunting. By calculating a minimum bounding box on the owls path, approximations of the area of the hunting ground can be made.

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[1] https://www.neuebrehm.de/uploads/books/424/3-89432-421-X-extract.pdf

2.3   Post-processing

After the parameters have been identified, they need to be contextualised as well. Firstly though, to ensure statistical validity the mean and standard deviation of duration of nocturnal activity and area of hunting need to be calculated. Next, the results need to be visualised. As there are multiple parameters to visualise, numerous visualisations can be applied.

- Map with the hunting ground of the owls

- Bar chart with each bar representing a time frame in which the owls started nocturnal activities

Further, to align the findings with our initial RQ, the results from both groups(urban and rural) are compared. In order to understand and contextualise these results, additional knowledge about the species may be required. Additionally, if time allows the python script will be developed into a QGIS tool.

3   Task division and time planning

Until the presentation on the 15th July, 2020, 4 weeks remain. In the following we will discuss our time planning of each phase presented in the methodology section. Report writing will take place after the presentation.

- Pre-processing (1st week)

- Development of the script(1st - 3rd Week)

- Post-processing (3rd 4th week)

As everyone is required to code, everyone will take part in the development of the script. While Caro and Aysel will lead the pre-processing, Mirjeta and Eric will lead the post-processing.

References

[1] Jackson Evans, Kyle Boudreau, and Jeremy Hyman. Behavioural syndromes in urban and rural populations of song sparrows. *Ethology*, 116(7):588–595, 2010.

[2] David Mouw PhD, Kenneth Kalitis, PhD Miriam Anver DVM, Joyce Schwartz, Anna Constan, Rolf Hartung PhD, PhD Bennett Cohen DVM, and Dan Ringler DVM. Lead. *Archives of Environmental Health: An International Journal*, 30(6):276–280, 1975. PMID: 166625.