Title:	Spatial Variation of Vigilance in Meerkats
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Keywords:	Meerkats Spatial Variations
Issue Date:	May-2023
Publisher:	IISER Mohali
Abstract:	Vigilance is crucial in cooperative animal groups due to the vital role it plays in ensuring survival. When animals move and interact as a group, they rely on each other to detect and respond to potential threats. Animal groups that communicate and coordinate their decision-making often adopt different positions and roles within the group. For example, individuals may take up positions on the periphery of the group to scan for predators, while others may protect the young and vulnerable members by being more alert near them. Understanding this spatial variation in vigilance in animals is crucial to understanding how animal groups organize themselves for the early detection of potential threats. Meerkats are an interesting study system in the context of vigilance. They rely on cooperative vigilance to detect and respond to predators while the others forage or rest. Prior studies of meerkat vigilance have shown that individuals adjust their vigilance in response to changing environmental conditions and group composition. Understanding how meerkat groups spatially vary their vigilance can shed light on how animals manage risk and allocate resources in social contexts. Using biologging and a machine learning-based behavioral classification, I studied the spatial variation of vigilance in meerkat groups. Using accelerometer data collected from habituated meerkats at the Kalahari Meerkat Project, and annotated video recordings of meerkat behaviors as our ground truth labels, I built a simple machine learning model to predict three behavioral states (foraging, vigilance, and running) from accelerometer recordings. I validated the model's performance using random sampling, as well as leave-one-individual-out and leave-one-group-out cross-validation to test its generality across different individuals and groups. Combining the resulting behavioral state information with 1 Hz GPS data, I then assessed where vigilance and foraging occurred in the group. Using Bayes' rule, I computed the probability of being in a particular behavioral state given the spatial position in the group. I found that meerkats are more likely to be vigilant when they are on the periphery of a group over multiple days of tracking data.
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