

Presence-only Model for Marked Point Processes: A Preferential Sampling Extension Solution for Fish Biomass Estimation

Preferential Sampling models have received much attention in the last few years. Although its original model is applied to Geostatistics, it can be recognized in other types of data, such as point processes, in the form of presence-only data. This has been already identified in the Statistics literature. It is valuable to draw advantages from both presence-only and preferential sampling specific literatures. In particular, we propose a way to deal with biased sampling of a continuous variable collected by opportunistic sampling. For our particular case, we employ the idea on sardine biomass collected during professional fishing expeditions. The data, although intuitively understood, presents complications such as two types of preferential sampling. One is about the fish presence locations, and the preferentiability happens due to the travel pattern of fishing boats not being representative of the region. The other happens with respect to the biomass itself, as the fishermen prefer visiting regions with larger biomass. These and other theoretical and practical aspects of the problem are discussed. A probabilistically well defined approach is discussed. Its results may be an incentive to apply data collection in fishing expeditions as a means for decision making aimed at benefiting both ecological and economical aspects.