Title:	Ecosystem Tipping Points: Investigating Cluster Size Distributions and Power Spectra Properties
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Abstract:	In this thesis, I study tipping points of ecosystems, focusing particularly on semi-arid ecosystems that show patchy vegetation. Semi-arid ecosystems show self-organization in their patches owing to local positive feedbacks. For instance, these could be facilitation by tree canopy covers and water constraints. Any changes in the positive feedback mech- anism could lead to a disruption in the ecosystem health possibly leading to tipping to a deserted state. Previous theoretical and empirical studies have tried to connect positive feedbacks with power law clustering and their subsequent decay could indicate tipping. However power-law decay fails to be a proper indicator if there is strong positive feedback in play in the ecosystem we are studying. This motivates us to study spatial disturbances in our system, more specifically the power spectra properties of our ecosystems in question. Apart from this, I attempt to make a possible connection of fractal dimension and average densities to the cluster size and power spectra properties. In my study, I use high resolution gray-scale raster datasets (2m x 2m) to study cluster sizes and power-spectra properties of the semi-arid ecosystems in different parts of Africa. Previous studies have been done at larger resolutions and power spectra properties of the same haven't been analysed in depth yet. One of the interesting results obtained over the course of this study is the fact that Lorentzian law happens to be a better fit compared to power-laws for most ecosystems which are far from transition.
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