

Fisher's Infinitesimal Model Features a Nice Convexity Structure

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Abstract

Fisher's infinitesimal model is a standard model of inheritance in quantitative genetics. Basically, a pair of parents give rise to offspring whose traits are normally distributed around the mean parental trait. We studied the corresponding integro-differential operator which is of collisional type. We identified a remarkable convexity structure which implies asynchronous exponential growth, with a 'spectral gap' (roughly speaking), as measured by some Fisher information, under the simple condition that selection acts through a convex function. We used a natural transformation, converting such a non-linear and non-conservative problem into a linear and conservative problem. The key step is a contraction estimate in the Wasserstein-Kantorovich metric W_∞ for which we shall present a recent, alternative, proof by Khudiakova, Maas, and Pedrotti. [This is a joint work with David Poyato and Filippo Santambrogio.]