

Spatial Comparison of Cricketers

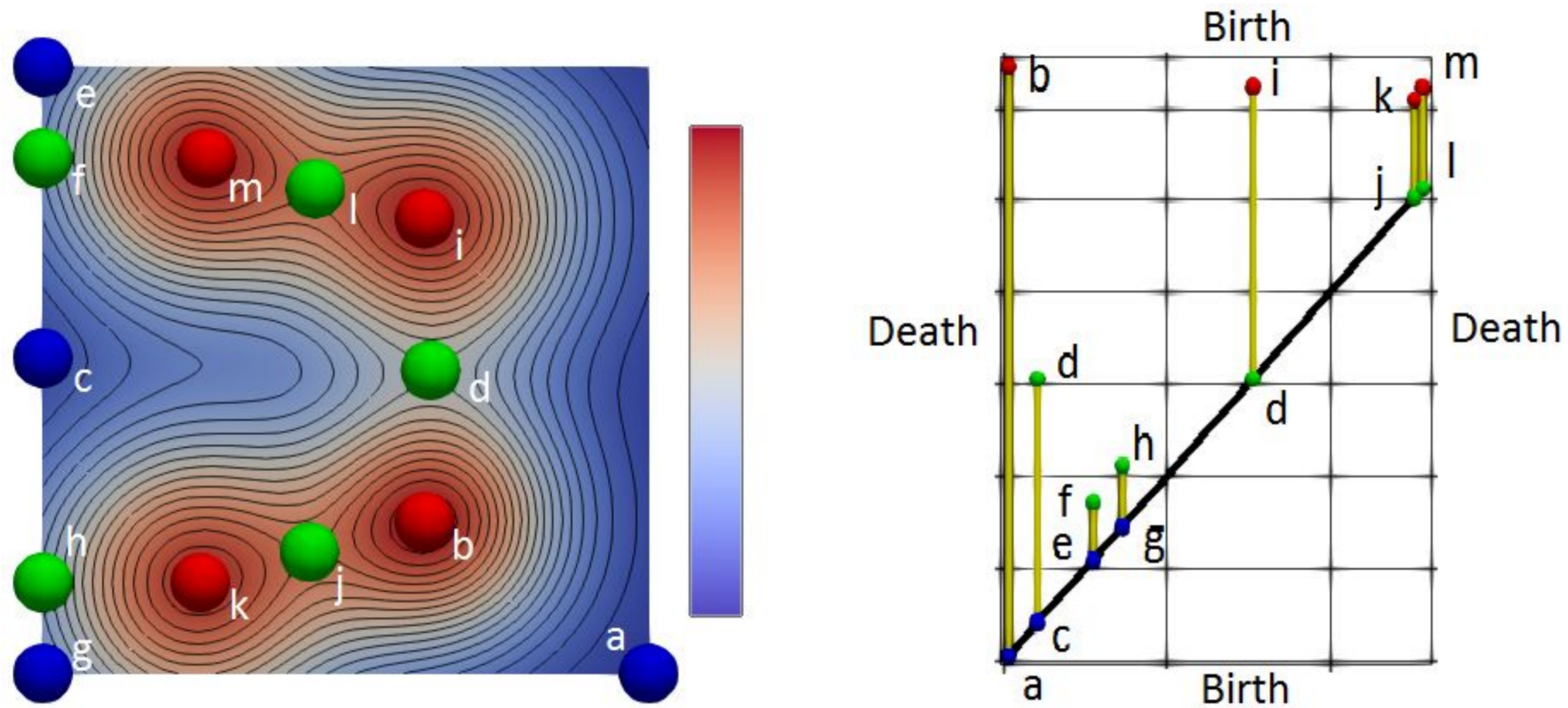
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INTRODUCTION

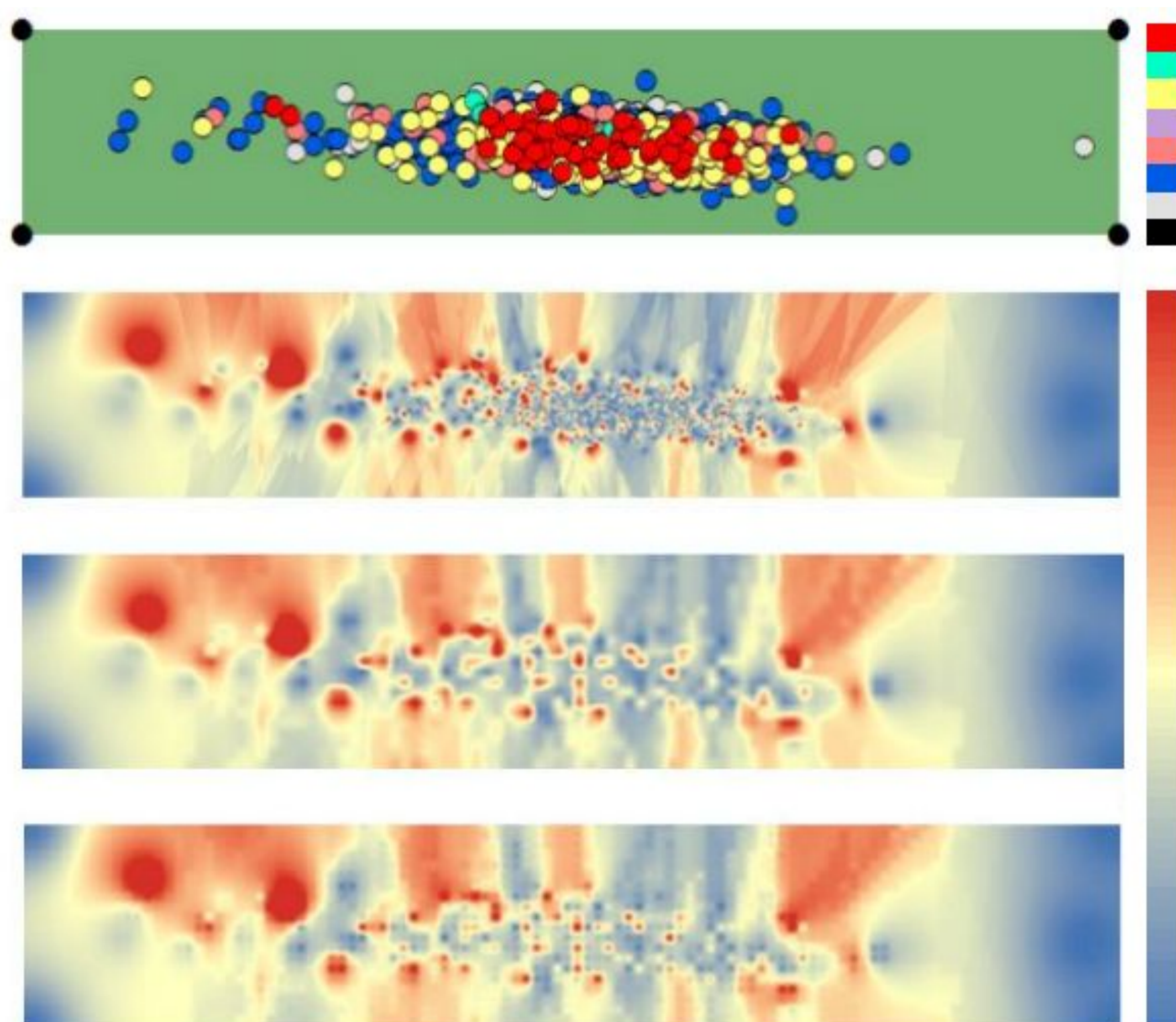
There has been an increasing demand from the cricketing community to introduce newer metrics to analyze the game. Data from ball tracking and prediction have urged statisticians to re-look at existing comparative measures. Using methods from topological data analysis, we introduce a new technique to compare cricketers using spatial features. We use data from IPL seasons (2012 - 2017) to compare our results with an existing ranking scheme.

TOPOLOGY BASED APPROACH

Understanding player performance across regions of the pitch, is akin to understanding the persistent features of super-level components of the scalar field. Pitch regions having high persistence indicate easier scoring ability. Here, the specific high and low function values of a scalar field are not too important, but rather their distribution is key for comparing the behaviour of two players. We capture this, by finding similarity between persistence diagrams.



Critical points of a scalar field defined on a PL 2-manifold and its persistence diagram

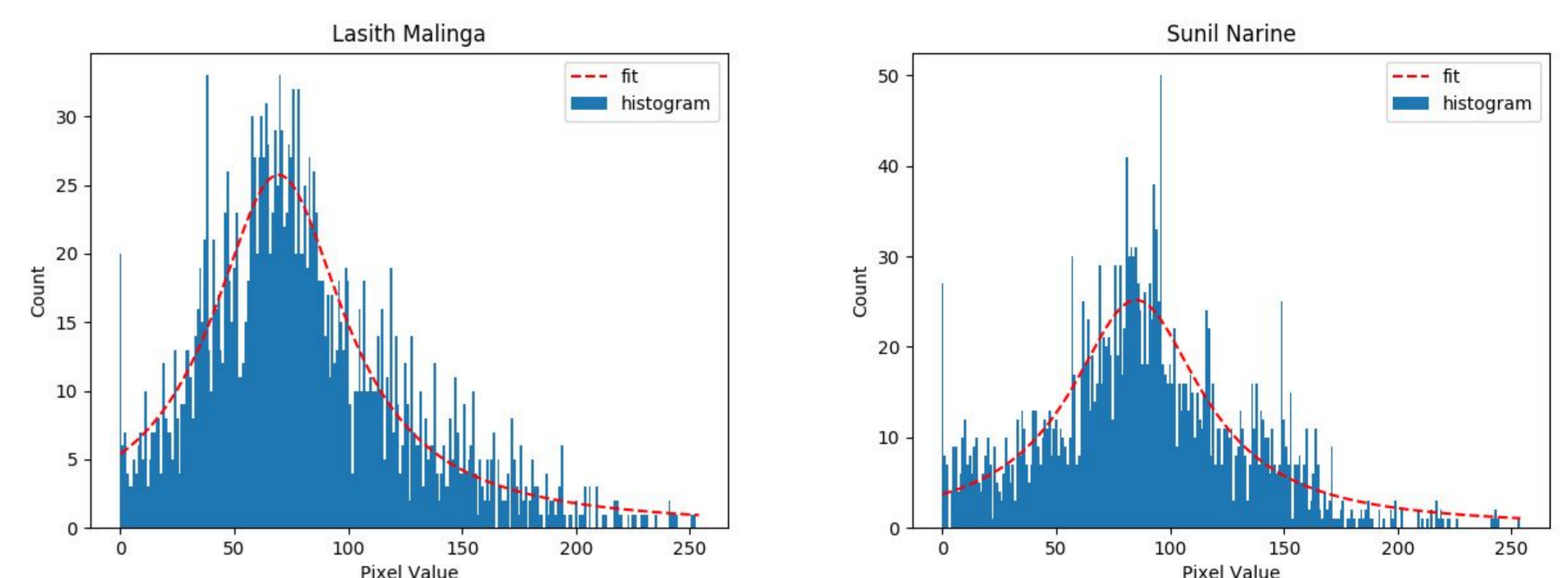


Sunil Narine's bowling across six IPL seasons

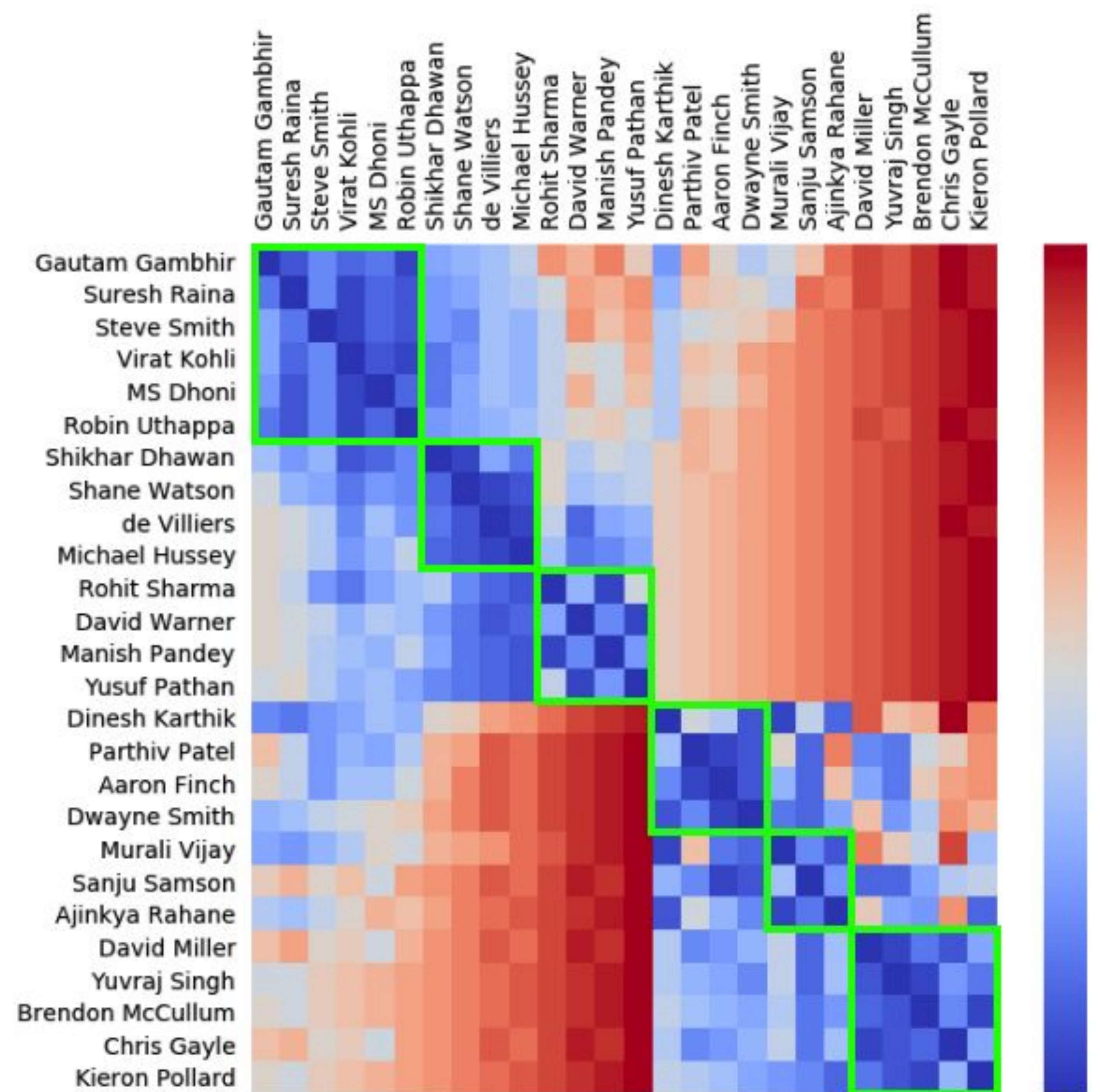
- a) Pitch-map visualization for runs conceded function
- b) Delaunay triangulation of pitch locations with z-coordinate as function value
- c) Scalar field after Shepard's interpolation
- d) Scalar field after removal of topological noise

METHOD

In order to efficiently compute the topological features of a scalar function representing a player, it is represented as a piecewise linear (PL) function, and its planar domain with a 2D regular grid. A function is defined on the vertices of the grid and linearly interpolated across each box. To account for the high density of a point cloud representing a player, the set of points are first interpolated to a regular grid using scattered data interpolation techniques and then a scalar function is computed for each player.



Grayscale pixel distribution used by Earthmovers distance for player comparison



Rank matrix for batsmen using Shepard's interpolation and Earthmovers distance

RESULTS

Our method identifies six different clusters of players "game closers", "slow-starting quick-scorers", "hit-or-miss players", "multiple role players", "stroke makers", and "extremely aggressive starters". We also note that our method is susceptible to the interpolation technique and distance measure used for comparison.