

1133-15-286

Mostafa Rahmani* (mostafa@knights.ucf.edu) and **George Atia** (george.atia@ucf.edu).

Innovation Pursuit: A New Approach to the Subspace Clustering Problem.

In subspace clustering, a group of data points belonging to a union of subspaces are assigned membership to their respective subspaces. We present a new approach dubbed Innovation Pursuit (iPursuit) to the problem of subspace clustering using a new geometrical idea whereby subspaces are successively identified based on their relative novelties. The proposed approach finds the subspaces consecutively by solving a series of simple linear optimization problems, each searching for some direction of innovation in the span of the data that is potentially orthogonal to all subspaces except for the one to be identified in one step of the algorithm. iPursuit can provably yield exact clustering even when the subspaces have significant intersections. The experiments with both real and synthetic data demonstrate that iPursuit can often outperform the state-of-the-art subspace clustering algorithms, more so for subspaces with significant intersections. The proposed idea for direction search is also integrated with spectral clustering to yield a new variant of spectral clustering based algorithms that mostly outperforms the existing spectral clustering based methods and exhibits superior performance in the challenging face clustering problem. (Received July 29, 2017)