

PURSUIT OF LOW-DIMENSIONAL STRUCTURES IN HIGH-DIMENSIONAL DATA

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In this talk, we will discuss a new class of models and techniques that can effectively model and extract rich low-dimensional structures in high-dimensional data such as images and videos, despite nonlinear transformation, gross corruption, or severely compressed measurements. This work leverages recent advancements in convex optimization for recovering low-rank or sparse signals that provide both strong theoretical guarantees and efficient and scalable algorithms for solving such high-dimensional combinatorial problems. These results and tools actually generalize to a large family of low-complexity structures whose associated regularizers are decomposable. We illustrate how these new mathematical models and tools could bring disruptive changes to solutions to many challenging tasks in computer vision, image processing, and pattern recognition. We will also illustrate some emerging applications of these tools to other data types such as web documents, image tags, microarray data, audio/music analysis, and graphical models.

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