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An elastic net-based hybrid hypothesis method for compressed video sensing

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Abstract Compressed Sensing, an emerging framework for signal processing, can be used in image and video application, especially when available resources at the transmitter side are limited, such as Wireless Multimedia Sensor Networks. For a low-cost and low-power demand, we consider the plain compressive sampling and low sampling rates and propose a Compressed Video Sensing scheme. As a result, most burden of video processing can be shifted to the decoder which employs a hybrid hypothesis prediction method in reconstruction. The Elastic net-based multi-hypothesis mode, one part of the prediction method, combines the multi-hypothesis prediction and the elastic net regression together. And in the process of decoding, either this mode or the single-hypothesis one is implemented based on the threshold which is selected from [1e-11, 1). Both of the prediction modes are carried out in the measurement domain and a residual reconstruction as the final step is executed to accomplish the recovery. According to the performance presented by the simulation results, the proposed multi-hypothesis mode provides a better reconstruction quality than the other multi-hypothesis ones and the proposed scheme outperforms the observed state-of-the-art schemes for compressed-sensing video reconstruction at low sampling rates.

Keywords Compressed sensing · Distributed video coding · Elastic net · Hypothesis prediction · Wireless multimedia sensor networks

1 Introduction

The traditional video coding standards share a common characteristic that the design of the encoders is more complex than the decoders. For this reason, these standards are not suitable for all application backgrounds. For example, in the rapidly developing Wireless Multimedia Sensor Networks (WMSN) [1], the lifetime of the large number of sensors has a great effect on the performance of the network. So the low-complexity transmitter with a good coding

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