On a Recovery Method with Approximation Guarantees for Noisy Unlimited Sampling

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***Abstract*—The unlimited sampling problem of recovering a bandlimited signal from measurements that are affected by a modulo operation has recently been addressed in a number of works employing different approaches. Many of these methods, however, are not robust to Gaussian noise, as local outliers can affect the global solution quality. In this talk we propose and analyze a method to address this challenge by locally optimizing the choice of the function representation among the many equivalent modulo representatives – separately for each sub-interval in a given subdivision of the domain. Our analysis reveals that a successful recovery requires a careful balance between two types of potential limitations. On the one hand, the feasibility of our least-squares retrieval strategy requires the amount of sub-intervals to be large enough, so that the input varies little inside each of them. On the other hand, we show that the conditioning of the resulting linear system matrix deteriorates for too many intervals. The study of this trade-off provides a first step towards the theoretical understanding of our proposed algorithm and a practical guidance for its implementation.**

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