Fast Sparse Period Estimation

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1 General Comments

This paper proposes a new fast method for estimating the period of sparse and noisy observations of a point process. The new idea is to used the periodogram of quantized observations that can be computed faster than the standard periodogram by using a chirp z-transform or a fast Fourier transform. The reviewer is not convinced that there is enough material deserving publication in the IEEE signal processing letters. Moreover, there are several important comments that should be addressed before a possible publication of this letter.

The main reviewer concern is about the choice of the quantization parameter q that should be explained more carefully. It is not sufficient to display two sets of curves obtained for two different values of q and to choose the best one without explanations. For instance, it is not clear whether the value of q chosen in this paper will be appropriate for other noise distributions or for other ways of generating the integers s_n. This point should be addressed carefully before a possible resubmission of the paper. The other reviewer comments are summarized below.

- p. 3, the authors mention "Sadler and Casey [24]... However, their estimator requires far larger transforms and produces less accurate results than the estimator described here (see Section VI)". Unfortunately, there is nothing in Section VI (which is the conclusion) supporting this claim. The authors should compare their results in term of accuracy and of computational complexity to the results of [24]. Including the Cramér-Rao bounds for the estimation of T_0 (as in [24]) would also be appreciated.

- p. 7, the authors indicate that they have used the Newton-Raphson (NR) method. More details should be provided here. For instance, what is the exact NR scheme used in this paper (there are several options)? How have the authors selected the total number of iterations? Is the quantized periodogram just used to initialize a Newton-Raphson procedure? Do the MSEs displayed in Fig. 3 correspond to the estimator obtained after applying the NR algorithm? Also, do the results displayed in Fig. 2 correspond to the total time required to compute the estimator (including the NR procedure) or just to the initialization of the NR procedure?

2 Detailed comments

- p. 5, in the definition of v_m, b_{m+l_1} should be replaced by $b_{m+l_{min}}$
- p. 6, “each of length L+K-1" might be replaced by “each of length $M = L + K - 1$"
- p. 8, $n = 2, ..., N$ should be $n = 1, ..., N - 1$
- p. 8, it is not completely clear to identify the curves associated with $N = 30$ and $N = 1200$. Can the authors display 4 curves associated with $\mu = 1$, $\mu = 10$, $N = 30$ and $N = 1200$?
- Typos: p. 2, “anomolies" should be “anomalies", p. 7, “quanitised" should be “quantized"
- Is it necessary to include 11 self citations in this letter? Removing some of these references would allow to save some space, which could be used to better explain some points mentioned above.