Approximate Joint Entropy for M Correlated Binary Sources

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***Abstract*—This paper proposes a method for to get an approximation of the joint entropy of M correlated binary sources; the approximation gets a linear calculation complexity in relation to the number of sources. Here, it is used a correlating model with a common binary source that through M binary symmetric channels in parallel to obtain the M correlated binary sources.**

***Index Terms*—Multiple correlated sources, large scale sensor networks, joint entropy.**

I. Introduction

In the work seen in [1], they are presented equations for the calculus of two cases the optimal minimum rates in joint source-channel coding of a set of correlated sources; thus, were showed methods for to get the minimal, common rate and sum rate. These rates fulfill the Slepian-Wolf [**?**] and channel capacity limit [**?**] theorems. The results show that, the calculus of the optimal rates of M correlated sources grows in complexity exponentially with M.

In this paper, is assumed the same system model and analyzed the same two cases that in [1], with the additional restriction that the sources are so far of the joint decoder, in comparing with the distance between sensors, so that the channel capacities in all channels are approximately same. On the other side, the correlation between sources is assumed as random or with spatial correlation [**?**], in contrast with studied in [2], [3], where the correlation between any source pair is same. Other restriction, it is the use of a specific model of correlated sources; being used a model similar to seen in [2], [3]; where M correlated sources are generates passing a common source across M binary symmetric channels (BSC). Using these considerations, it can be deduced: for an optimal common rate a method with a calculus complexity that grows linearly with the number of sources, and for optimal sum rate a calculus method of very low complexity when compared of common rate case.

This paper is organized as follows. The model system and some definitions used in this work are presented in Section II, a brief review of the work in [1] with a new solution method for to get the optimal common rate is presented in Section **??**, in this line a new method for to get the optimal sum rate is described in Section **??**. Some demonstrations need for to solve the last sections are presented in Section IV and Section III concludes the paper with some final remarks.

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II. System Model and Definitions

III. Final Remarks and Conclusions

In this letter, we considered joint source-channel coding of correlated sources transmitted over orthogonal

Acknowledgment

IV. Appendix

References

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