PROBABILITY DISTRIBUTIONS OF INTER-SAMPLE TIME OF EVENT-BASED SAMPLING ENCODERS

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DECLARATION

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ABSTRACT

Probability Distributions of Inter-Sample Time of Event-Based Sampling Encoders

Keywords: Event Based Sampling, Memory Based Event Triggering, Sampling Rate Probability Distribution

Bandwidth is the most important resource in telecommunications. Though recent developments have resulted in a significant increase of available bandwidth, the demand for bandwidth continues to follow and new demands are also created with the introduction of new technologies. Internet of Things is one such development that has resulted in increased demand for bandwidth due to the interconnection of smart sensors and actuators to the Internet.

Increased demand for limited bandwidth results in congestion which can in tern negatively affect the reliability of the network by causing latency (delay), jitter (delay variation) and data loss (in the form of packet drops). Event based sampling is a strategy of mitigating congestion that does so by reducing network traffic. This is achieved by reducing the effective sampling rate and it is highly successful if the signal exhibits high dependency between samples. Despite numerous empirical studies, no attempt has been made to obtain a probability distribution of the traffic rate of such encoders. This study aims to obtain such a model for a type of event-based sampling known as memory-based event triggering.

With a statistical model of the generated traffic, it is possible to get an idea about the network capabilities and effectively mitigate the congestion. Correctness of the statistical model can be verified by the empirical results and it is possible to easily determine the maximum number of sensors for a given network bandwidth with a given quality of service.

DEDICATION

To My Parents, Wife, Teachers and who ever helped.

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LIST OF ABBREVIATIONS

ADM	Adaptive Delta Modulation
DEM	Deadband Error Modulation
ETADM	Event Triggered Adaptive Differential Modulation
MBET	Memory Based Event Triggering
MET	Memory-less Event Triggering
PBET	Prediction-Based Event Triggering
KLD	Kullbeck-Liebler Divergance
TVD	Total Variation Distance
IoT	Internet of Things
IIoT	Industrial Internet of Things