



Age of Incorrect Information in Unreliable Communication Channels Under Resource Constraints

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ABSTRACT

In numerous real-time applications, timely delivery of information is fundamental. This has led to the emergence of *information freshness* metrics to evaluate the performance of communication systems [1]. The Age of Incorrect Information (AoII) is a recently proposed freshness metric that penalizes the time the information at the source and the receiver are different [2]. As such, the minimization of the AoII ensures that the receiver has correct information as quickly as possible.

Our work addresses the problem of finding an AoII-optimal transmission policy that employs a hybrid automatic repeat request (HARQ) protocol. An HARQ protocol is essential for correcting errors in noisy communication channels by allowing the receiver to ask for additional data to decode erroneous messages. Similar to real-world problems, we impose a resource constraint such that the transmitter can operate only a limited average amount of times. We derive the structure of the optimal transmission policy and compute it with an efficient algorithm. Numerical results illustrate the impact of the HARQ and the resource constraint on the average AoII.

REFERENCES

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