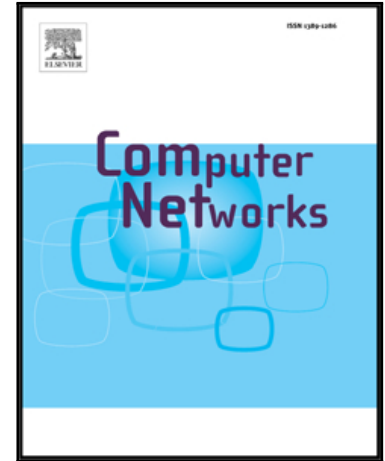


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A Geo-Temporal Mobility Prediction Method for Cooperative Time-validity-constrained Content Delivery in Opportunistic Networks

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Abstract— The opportunistic network is a promising network paradigm where mobile devices share or exchange content only through opportunistic contact with one another. However, there is still no effective solution for the growing needs that require the delivery of time-sensitive content over opportunistic networks. Time sensitivity refers to the constraint that content must be delivered to a destination within a given time interval, which is called the time interval of data validity. This content delivery mode suffers from unreliable and intermittent connections between mobile nodes and faces difficulty in selecting eligible relay nodes that are able to accurately delivery the content within the time interval of data validity. This paper presents a new time-validity-constrained content delivery method (TVCD), which applies a cooperative content dissemination protocol between mobile nodes to overcome the drawbacks of opportunistic networks on time-sensitive content delivery. TVCD relies on an accurate geo-temporal mobility prediction algorithm that refers to two probabilistic models for the newest travel tendency and travel location dependency of each mobile node. This algorithm can benefit content carriers in the selection of relay or successor nodes for realizing cooperative content delivery. TVCD was validated with several real and synthetic mobility traces. The simulation results showed that TVCD had a higher delivery rate and lower transmission overhead than existing methods. Moreover, the performance of TVCD was robust to the variation of node mobility and time granularity of node traveling records.

Index Terms— Opportunistic Network, Data Dissemination, Time Validity, Mobility Prediction.

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