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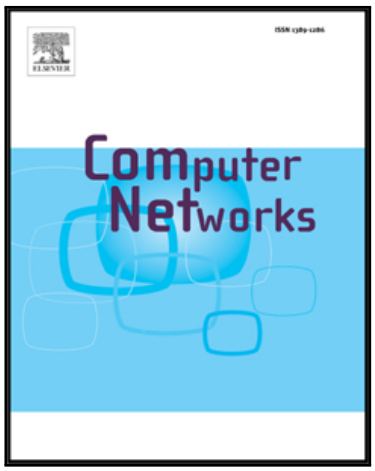

Addressing Niche Demand based on joint Mobility Prediction and Content Popularity caching

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Addressing Niche Demand based on joint Mobility Prediction and Content Popularity caching

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Abstract

We present an efficient mobility-based proactive caching model for addressing *niche* mobile demand, along with popularity-based and legacy caching model extensions. Opposite to other proactive solutions which focus on popular content, we propose a distributed solution that targets less popular, personalised or dynamic content requests by prefetching data in small cells based on individual user mobility prediction. According to notable studies, niche demand, particularly for video content, represents a *significant* 20-40% of Internet demand and follows a growing trend. Due to its novel design, our model can directly address such demand, while also make a joint use of content popularity information with the novelty of dynamically *tuning* the contribution of mobility prediction and content popularity on local cache actions.

Based on thorough performance evaluation simulations after exploring different demand levels, video catalogues and mobility scenarios including human walking and automobile mobility, we show that gains from mobility prediction can be high and able to adapt well to temporal locality due to the short timescale of measurements, exceeding cache gains from popularity-only caching up to ~41% for low caching demand scenarios. Our model's performance can be further improved at the cost of an added computational overhead by adapting cache replacements by, e.g. in the aforementioned

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