

**Title:** The Online Event-Detection Problem

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**Abstract:** Given a stream of  $N$  elements, a  $f$ -heavy hitter is an item that occurs at least  $fN$  times in  $S$ . The problem of finding heavy-hitters has been extensively studied in the streaming literature. In this talk, I will present a related problem. We say that there is a  $f$ -event at time  $t$  if an element occurs exactly  $fN$  times in the stream of elements till time  $t$ . Thus, for each  $f$ -heavy hitter there is a single  $f$ -event which occurs when its count reaches the reporting threshold  $fN$ . We define the online event-detection problem (OEDP) as: given  $f$  and a stream  $S$ , report all  $f$ -events as soon as they occur.

Many real-world monitoring systems demand event detection where all events must be reported (no false negatives), in a timely manner, with no non-events reported (no false positives), and a low reporting threshold. As a result, the OEDP requires a large amount of space ( $\Omega(N)$  words) and is not solvable in the streaming model or via standard sampling-based approaches. Since OEDP requires large space, I will focus on cache-efficient algorithms in the external-memory model and present algorithms for the OEDP that are within a log factor of optimal.

**Bio:** Shikha Singh is currently an Assistant Professor of Computer Science at Wellesley College and will be joining Williams College as an Assistant Professor in Fall 2019. She obtained her PhD in Computer Science from Stony Brook University and her Integrated MSc. in Mathematics and Computing from IIT Kharagpur. Her broad research interests include algorithms and data structures for big data, algorithmic game theory and complexity theory.