LMS Computer Science Colloquium – speakers, titles and abstracts

Christian Konrad (University of Bristol)
Streaming Algorithms, Communication Complexity, and the Maximum Matching Problem

This talk explores the connections between Streaming Algorithms and Communication Complexity, using the Maximum Matching problem as a key example.

Streaming algorithms for graph problems process sequences of edge insertions and deletions that make up graph while using a memory that is much smaller than the graph itself. Communication Complexity examines the number of bits that multiple parties must exchange to solve a given problem. These two fields are closely linked, as lower bounds in communication complexity imply lower bounds on the space requirements of streaming algorithms. In this talk, we will delve into this connection through the lens of the Maximum Matching problem, tracing how this relationship has been leveraged from the earliest works on streaming algorithms for matchings in 2004 to the present.

Peter Kiss (University of Vienna)
$(1+\epsilon)$-Approximate Sub-Linear and Dynamic Matching

We show a fully dynamic algorithm for maintaining a $(1+\epsilon)$-approximate size of maximum matching of the graph with n vertices and m edges using $m^{0.5-\Omega_{\epsilon}(1)}$ update time. This is the first polynomial improvement over the long-standing $O(n)$ update time, which can be trivially obtained by periodic recomputation. Thus, we resolve the value version of a major open question of the dynamic graph algorithms literature.

Our key technical component is the first sublinear algorithm for $(1, \epsilon n)$-approximate maximum matching with sublinear running time on dense graphs.

All previous algorithms suffered a multiplicative approximation factor of at least 1.499 or assumed that the graph has a very small maximum degree.

Peter Davies-Peck (University of Durham)
The Distributed Lovász Local Lemma

The Lovász Local Lemma (LLL) is a fundamental result in probability theory, used to prove the existence of mathematical objects via the probabilistic method, with applications in many areas including routing and scheduling, hash functions, and(a)1.8 (a)17 JD Relatively recently, the LLL has also been shown to have a central role in the complexity theory of In this talk, we will survey the background of the distributed LL distributed LLL algorithms and their implications.

Sagnik Mukhopadhyay (University of Birmingham)
Unified Algorithm Design in Modern Computational Models

I will discuss recent advances in the design-paradigm of algorithms, which are algorithms that can be implemented across various computational models in a black-box manner. Modern computational models a(od.9 (t))-