

INSTITUTSSEMINAR

Am Dienstag, dem 5. November 2024, spricht um 12:30 Uhr im Raum Z 2073

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zum Thema:

"On Dynamic Graph Algorithms with Predictions".

Zusammenfassung:

Dynamic algorithms have to maintain a solution to some computational problem. The input to this algorithms is constantly changing and the main goal is to handle this updates more efficiently than just recomputing the whole solution from scratch. One way to achieve this is to predict future updates. For example, predict which edges will be deleted next or which vertices will be inserted.

In this seminar I will present some results by Jan van den Brand, Sebastian Forster, Yasamin Nazari and Adam Polak, who studied dynamic graph algorithms with predictions. We will see algorithms for transitive closure and all-pairs shortest paths problems with predictions on edge updates, which require $\tilde{O}(n^{(3+\omega)/2})$ time for preprocessing, $\tilde{O}(1)$ worst-case time for updates and $\tilde{O}(\eta^2)$ worst-case time for queries. Here η is defined by the maximum difference between the predicted and actual insertion (deletion) time of an edge.

In the second group of the results, following problems are considered with respect to predicted vertex updates: triangle detection, directed cycle detection, single source reachability, strong connectivity, maximum matching size and counting st-paths. All these problems can be reduced to dynamic matrix inverse with predictions, which can be solved in $O(n^\omega)$ time for preprocessing and $O(n^{\omega-1} + \min\{n\eta, n^2\})$ worst-case update time, where η represents how much earlier the update occurs than predicted. All presented algorithms beat lower bounds conditional on online matrix-vector multiplication for corresponding online problems in the case of accurate enough predictions.

Alle Interessierten sind herzlich eingeladen.