Majority Circuits and Sorting Networks of Small Depth

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Abstract: We address two classical related problems in computational complexity theory: constructing a low depth monotone boolean circuits computing majority function and constructing low depth sorting networks. For both cases there is logarithmic depth construction by Ajtai, Komlós and Szemerédy (1983), but it is complicated and impractical. The search for better construction continues.

We will discuss small depth versions of these problems. In these settings we restrict the depth d of the circuit or the sorting network, but we allow the use of circuit gates and network comparators of larger fan-in k. We are interested in the trade-off between k and d. In the talk we will discuss recent results in this direction. The talk is based on the joint work with Natalia Dobrokhotova-Maikova, Alexander Kozachinskiy and Alexander Kulikov.