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Implementing the Graph Model of the Spread of a Pandemic on GPUs

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Modeling the spread of viruses is an urgent task in modern conditions. In the created model, contacts between people are represented in the form of the Watz and Strogatz graph. We studied graphs with tens of thousands of vertices with a simulation period of six months. The paper proposes methods for accelerating computations on graph models using graphics processors. In the considered problem, there were two resource-intensive computational tasks: generating an adjacency matrix of a graph that simulates the presence of contacts between people and traversing this graph in order to simulate infection. The calculations were carried out in sequential mode and with acceleration on GPUs. The modeling system software is implemented using the Cuda, CuPy, PyTorch libraries. The calculations were carried out using the Tesla T4 graphics accelerator. Compared to computations without using graphics accelerators, their application gave an 8-fold increase in speed. The reported study was funded by RFBR and CNPq, FASIE, DBT, DST, MOST, NSFC, SAMRC according to the research project No. 20-51-80002.

Summary

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