A Survey on Dynamic Graph Processing on GPUs: Concepts, Terminologies and Systems

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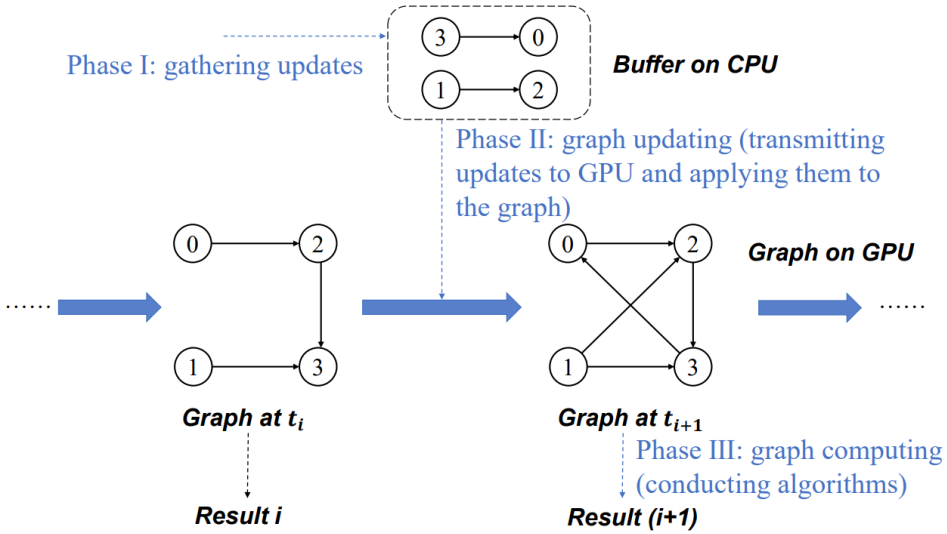
Frontiers of Computer Science, DOI: 10.1007/s11704-023-2656-1

Problems & Ideas

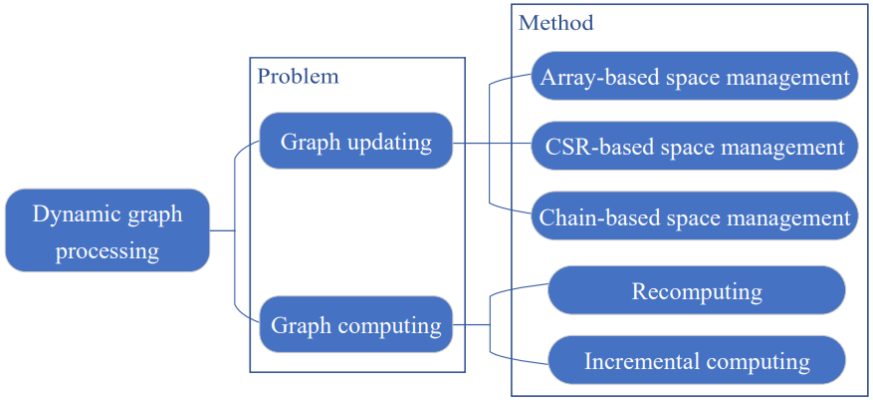
- GPUs are widely used to accelerate dynamic graph processing tasks in recent years.
- Dynamic graph processing systems on GPUs solve two issues:
  - graph updating (maintaining graph data when updates occur).
  - graph computing (producing the latest analytics results in time).
- Ideas: We review existing GPU-based dynamic graph processing systems from the aspects of graph updating and computing, and develop a taxonomy of these systems to describe their similarities and differences.



A general workflow of dynamic graph processing on GPUs

Main Contributions

- Contributions:
  - We introduce the concept and graph analytics of dynamic graphs and discuss typical models to represent dynamic graphs;
  - We propose a taxonomy of GPU-based dynamic graph processing systems, survey existing dynamic graph processing systems on GPUs, and classify these systems according to our taxonomy;
  - We discuss the challenges and future research directions of dynamic graph processing on GPUs.



Methods	Typical systems
array-based space management	cuSTINGER [69], Hornet [72], GPU-LSM [77]
CSR-based space management	DCSR [67],GPMA [65], LPMA [78]
chain-based space management	aimGraph [68], faimGraph [70], Slabhash [71]

Methods	Typical systems
recomputing	Tripathy et al. [82], Tödling et al. [83]
incremental computing	Evograph [44], Makkar et al. [74], Zhang et al. [84], HyPR [85], Guo et al. [75], Khanda et al. [86]

Left: the taxonomy of dynamic graph processing systems on GPUs; Right: the classifications of existing dynamic graph updating systems and dynamic graph computing systems.