Maximum weight matching

- In the first phase, the initial set of locally dominant edges are identified and added to matching set $M$.
- Next phase is iterative, for each vertex in $M$, its unmatched neighboring vertices are matched.

Distributed-memory Graph Algorithms: Case studies with Community Detection and Weighted Matching


*Washington State University, Pullman, WA  *Pacific Northwest National Laboratory, Richland, WA

Objectives:

- To devise heuristics that improve execution time performance and/or quality.
- Implemented half-approximate matching using MPI Send-Recv (NSR), Neighborhood collectives (NCL) and RMA.

Heuristics for Community Detection

- Objectives:
  - Early Termination
  - Threshold Cycling
  - Incomplete coloring

Performance: Community Detection

- Experiments conducted on NERSC Cori and Edison supercomputers.
- Performance results for matching on Cori.
- Energy/Memory for matching on Cori.

Communication characteristics on NERSC Cori (1K processes)

- Matching characteristics:
  - Friendster (1.8B edges)
  - R-MAT graph (2.1B edges)

Performance: Half approximate matching

- Objective:
- Observed 2-3x speedup on 1-4K processors for both NCL and RMA versions relative to NSR.

References


Acknowledgements

The research is in part supported by the U.S. DOE ExaGraph project, a collaborative effort of U.S. DOE SC and NNSA at DOE PNNL.