**SYNC or ASYNC? Time to Fuse for Distributed Graph-parallel Computation**

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### About Graph Algorithm

**Collaborative Filtering**
- Alternating Least Squares

**Structured Prediction**
- Loopy Belief Propagation

**Classification**
- Neural Networks

"Think as a Vertex"

### Distributed Graph-parallel Systems

**Algorithm**
- Impl. compute() for vertex

**Computation**
- Compute all Vertex in parallel

**SYNC**
- Regular
- Slow
- I/O Bound
  - Graph

**ASYNC**
- Irregular
- Fast
- CPU bound
  - Machines

**Properties**
- Communication
- Convergence

**Favorites**
- Algorithm
- Parallel Workload
- Scalability

### Deficiency of Existing Scheduling (e.g. SYNC vs. ASYNC)

**Divergence**

- Execution Stage

**Experiment**

1. The divergence results complexity in mode choosing, and suboptimal performance with either single-mode.
2. Diff. in **internal structures** should be maintained convertible from each other.
3. Ideal benefit requires appropriate switch timing.

### Challenges and Opportunities

**PowerSwitch**: Adaptive Mode Switch for Graph-parallel Computation

To support transparent adaptive mode switch:
- Profiler
- Predictor

Normalized throughput with heuristic rules.

- Compatible Fault Tolerance
- Convertor:

**Source**: [http://ipads.se.sjtu.edu.cn/projects/powerswitch.html](http://ipads.se.sjtu.edu.cn/projects/powerswitch.html)