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| --- | --- | --- | --- | --- |
| Facet and View | Comments | SP | DB | NI |
| Facets in Problem Architecture View (AV) |
| 1 | Pleasingly Parallel | 1 | M | S | H |
| 2 | Classic MapReduce | 1 1 1 1 1 1 | M | H | H |
| 3 | Map-Collective | 1 | S | S | H |
| 4 | Map Point-to-Point (graphs) | 1 | H | S | M |
| 5 | Map Streaming | Property of growing importance. Not well benchmarked | N | N | H |
| 6 | Shared memory (as opposed to distributed parallel algorithm) | Corresponds to problem where shared memory implementations important. Tend to be dynamic asynchronous  | S | N | S |
| 7 | Single Program Multiple Data SPMD | 1 1 | H | M | H |
| 8 | Bulk Synchronous Processing BSP | 1 1 | H | M | H |
| 9 | Fusion | Only present for composite Ogres | N | N | H |
| 10 | Dataflow | Only present for composite Ogres | N | N | H |
| 11 | Agents | Clear but uncommon qualitative property | N | N | S |
| 12 | Orchestration (workflow) | Only present for composite Ogres | N | H | H |
|  |
| Facets in Execution View (EV) |
| 1 | Performance Metrics | Result of Benchmark | - | - | - |
| 2 | Flops per Byte (Memory or I/O). Flops per watt (power). | I/O Not needed for “pure in memory” benchmark. Value needs detailed quantitative study. Could depend on implementation | - | - | - |
| 3 | Execution Environment (LN = Libraries needed, C= Cloud, HPC = HPC, T=Threads, MP= Message Passing) | Depends on how benchmark set up. Could include details of machine used for benchmarking here | - | - | - |
| 4 | Volume | 1 | - | M | - |
| 5 | Velocity | 1 | N | S | H |
| 6 | Variety | 1 | N | S | H |
| 7 | Veracity | Most problems would not discuss but potentially important | N | N | M |
| 8 | Communication Structure (D=Distributed, I=Interconnect, S=Synchronization) | Qualitative property – related to BSP and Shared memory | U | U | U |
| 9 | D=Dynamic or S=Static | Clear qualitative property. Familiar from parallel computing | H | H | H |
| 10 | R=Regular or I=Irregular | H | H | H |
| 11 | Iterative? | Clear qualitative property. Highlighted by Iterative MapReduce and always present in classic parallel computing | H | S | H |
| 12 | Data Abstraction(K= key-value, BW= bag of words, BI = bag of items, P= pixel/spatial, V= vectors/matrices, S= sequence, G= graph) | 1 1 | H | M | H |
| 13 | M= Metric Space or N= not? | Clear qualitative property discussed in [67] | H | N | H |
| 14 | NN= O(N2) or N= O(N)? | Clear qualitative property highlighted in [3] | H | N | H |
|  |
| Facets in Data Source&Style View (DV) |
| 1 | SQL/NoSQL/NewSQL? | 1 1 1 1 1 1 | N | H | H |
| 2 | Enterprise data model (warehouses) | 1 1 1 1 1 | N | H | M |
| 3 | Files/Objects? | 1 | N | S | H |
| 4 | HDFS/Lustre/GPFS? | 1 1 1 1 1 1 1 | N | H | H |
| 5 | Archive/Batched/Streaming | Clear qualitative property but not for kernels as describes how data collected | N | N | H |
| 6 | Shared/Dedicated/Transient/Permanent | Clear qualitative property of data whose importance is not well studied. | N | N | H |
| 7 | Metadata/Provenance | Clear qualitative property but not for kernels as important aspect of data collection process | N | N | H |
| 8 | Internet of Things | Clear qualitative property. | N | N | H |
| 9 | HPC Simulations | Clear qualitative property | N | N | H |
| 10 | Geographic Information Systems; | Clear property but not for kernels | S | N | H |
|  |
| Facets in Processing View (PV) |
| 1 | Micro-benchmarks | 1 1 1 | N | H | N |
| 2 | Local Analytics or Informatics | 1 1 1 | H | H | H |
| 3 | Global Analytics or Informatics | 1 1 1 1 | H | H | H |
| 4 | Base Statistics | Describes simple statistical averages needing simple MapReduce. MRStat in [5] | N | 1 | M |
| 5 | Recommender Engine | 1 | N | M | H |
| 6 | Search/Query/Index | 1 1 1 1 1 1 | S | H | H |
| 7 | Classification | 1 1 | S | M | H |
| 8 | Learning | 1 | S | S | H |
| 9 | Optimization Methodology ( ML= Machine Learning, NO = Nonlinear Optimization, LS = Least Squares, EM = expectation maximization, LQP = Linear/Quadratic Programming, CO = Combinatorial Optimization) | 1 1 | H | M | H |
| 10 | Streaming | Clear important class of algorithms | N | N | H |
| 11 | Alignment | 1 | N | S | M |
| 12 | Linear Algebra Kernels | 1 | H | S | H |
| 13 | Graph Algorithms | 1 1 | H | M | M |
| 14 | Visualization | Clearly important aspect of data analysis but different in character to most other facets | S | N | H |