



# Linear Algebra Based High-Performance Graph Analysis

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- Linear algebra based algorithms for graph analysis
  - ▶ GraphBLAS-based algorithms design, implementation and evaluation
  - ▶ Portable multi-GPGPU implementation of GraphBALS-like API
  - ▶ GraphBLAS API analysis
- Path problems with constraints
  - ▶ Formal Language Constrained Path Querying
    - ★ New algorithms development
    - ★ Complexity analysis
    - ★ New classes of languages investigation
    - ★ High performance algorithms implementation and evaluation

- Tools

- ▶ Spla: generalized sparse linear algebra framework with vendor-agnostic GPUs accelerated computations
- ▶ SPbLA: library of GPGPU-powered sparse boolean linear algebra operations
- ▶ CFPQ\_PyAlgo: set of GraphBLAS-based FLPQ algorithms
- ▶ GLL4Graph: CFPQ for Neo4j
- ▶ CFPQ for RedisGraph

# Our Results

- Tools

- ▶ Spla: generalized sparse linear algebra framework with vendor-agnostic GPUs accelerated computations
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- Papers (> 10)

- ▶ SPbLA: The Library of GPGPU-Powered Sparse Boolean Linear Algebra Operations (GrAPL@IPDPS)
- ▶ Evaluation of the context-free path querying algorithm based on matrix multiplication (GRADES-NDA@SIGMOD)
- ▶ Multiple-Source Context-Free Path Querying in Terms of Linear Algebra (EDBT, Core A)
- ▶ Context-free path querying by matrix multiplication (GRADES-NDA@SIGMOD)