applications *software*

introduction to *network science in Python* (*NetPy*)

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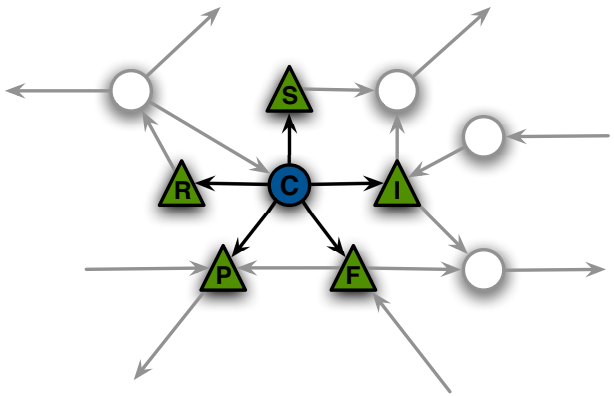
software *networks*

— *software class dependency* networks [ŠB11]

— *nodes* are *classes* and *links* are *dependencies*

```
class C extends S implements I {

        F field;

        public C() { ... }

        void foo(P parameter) { ... }

        private R bar() { ... }

}
```

software class C



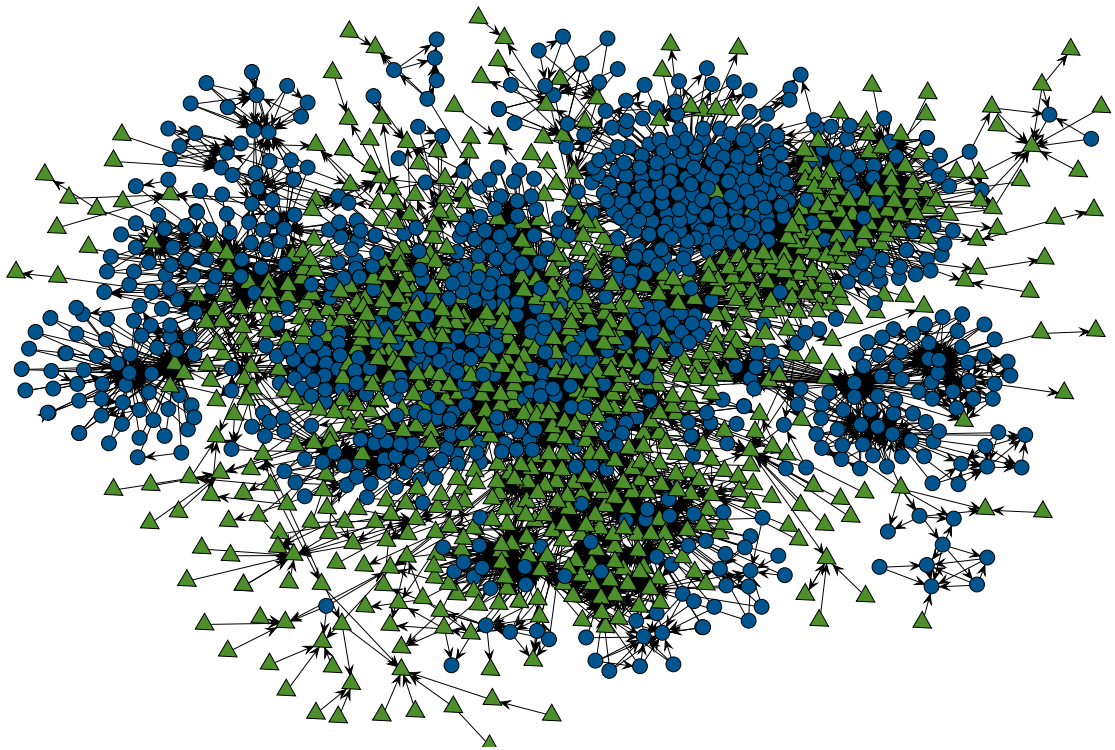
dependencies of class C

*software class dependency networks encode only signatures

software *structure*

— *clustering* in *Lucene class dependency* network [ŠŽBB14]

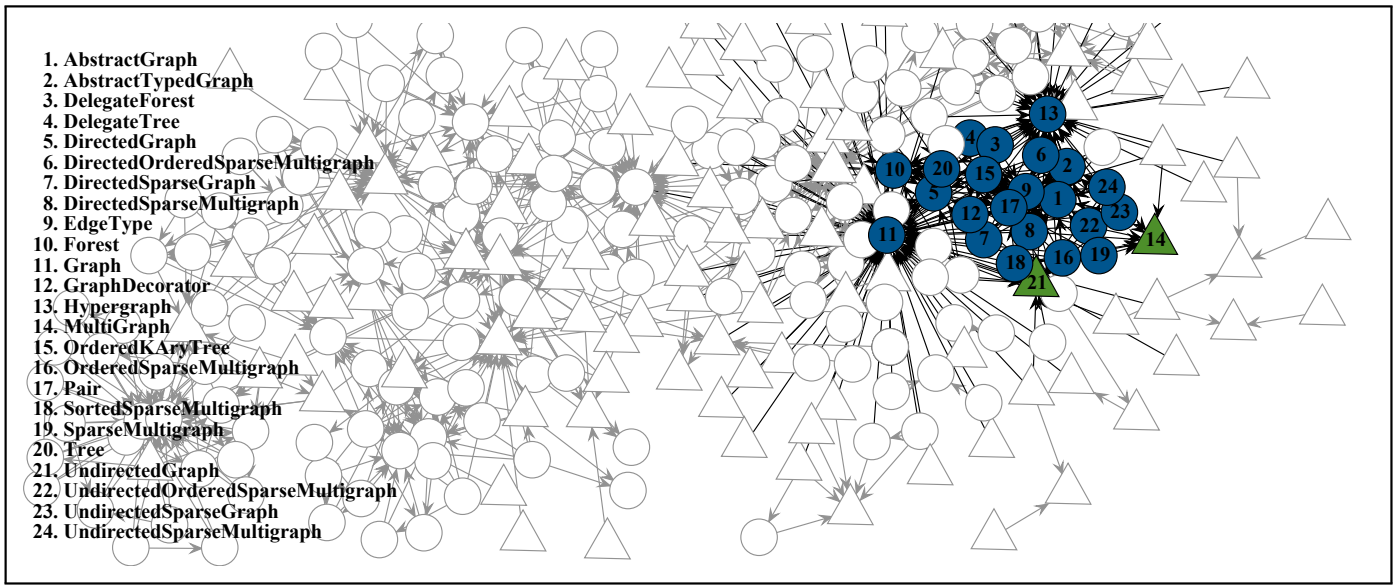
— *software structure* is *scale-free* and *"small-world"* [VCS02]

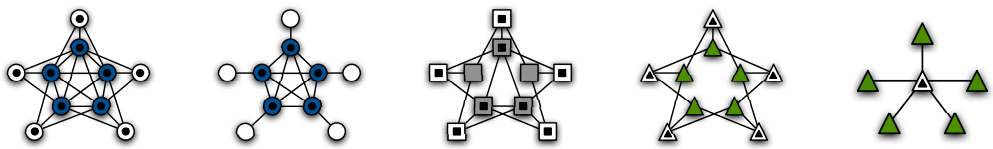


software *clusters*

— *clusters* in *JUNG class dependency* network [ŠŽBB14]

— *communities* are *core classes of software library* [ŠB11]

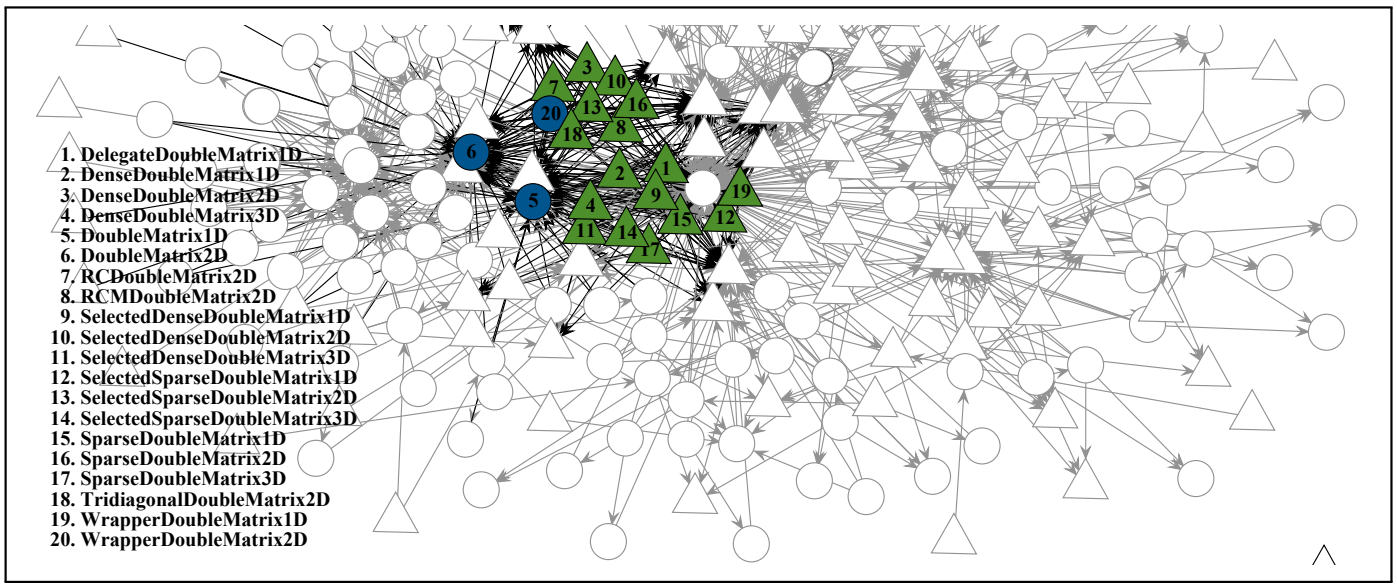


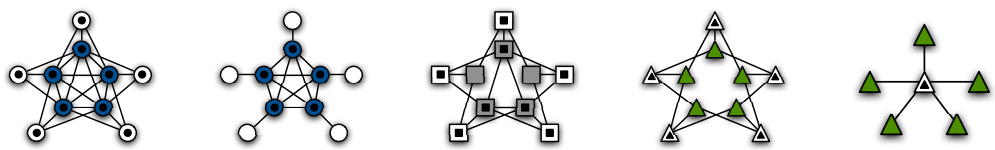


software *clusters*

— *clusters* in *colt class dependency* network [ŠŽBB14]

— *anti-communities* are *classes with same function* [ŠB12b]

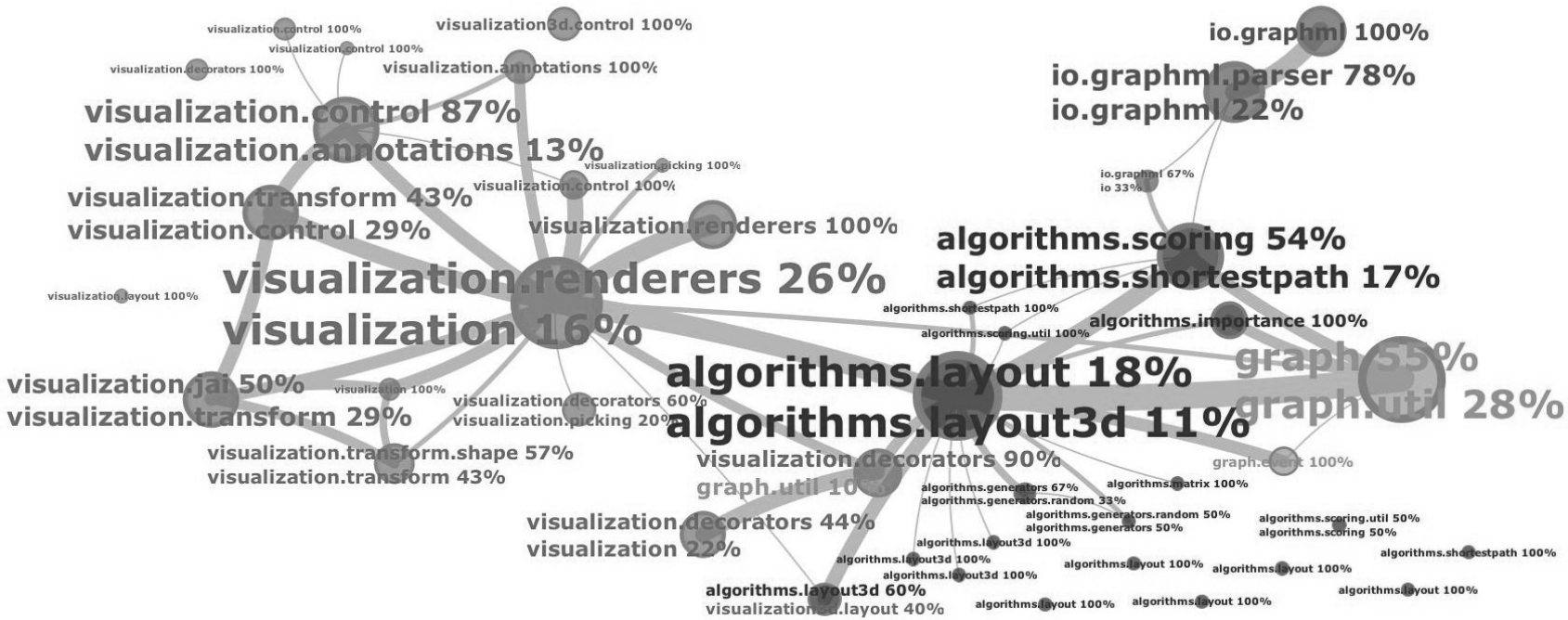




software *abstraction*

— *communities* in *JUNG class dependency* network [ŠB11]

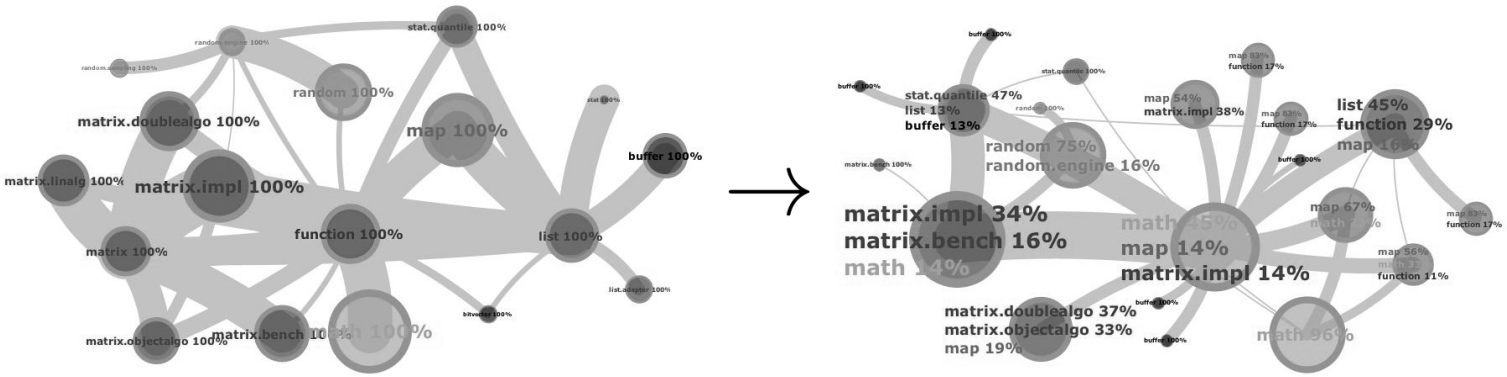
— *clusters* give *high-level abstraction of software library*



software *organization*

— *clusters* in *colt class dependency* network [ŠB11]

— *modular/functional organization of software packages*



$Q = -0.0262$ $Q = 0.5020$

software *mining*

— *mining* of *JUNG class dependency* network [ŠŽBB14]

— *clusters* allow *prediction* of *software classes metadata*

	baselines		**clusters**
metadata	network	*neighbors*	*propagation*
2 types	84.4%	65.0%	85.2%
9 versions	44.3%	67.7%	72.8%
11 developers	44.3%	71.6%	71.0%
31 packages	11.4%	72.2%	74.2%
5 high-level	44.3%	89.1%	90.5%

software *references*

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