applications *software*

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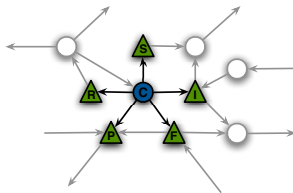
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software *networks*

— *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() { ... }

}
```
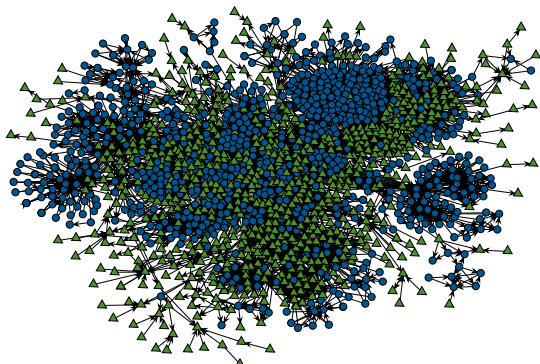
software class C

dependencies of class C
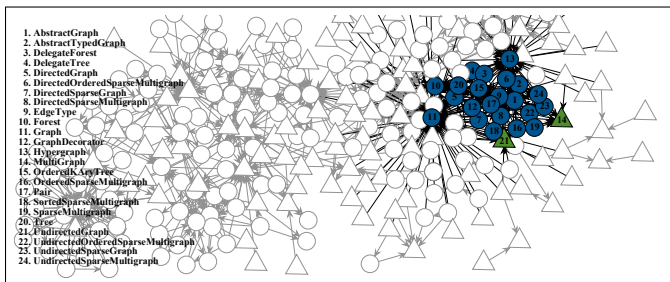
*software class dependency networks encode only signatures

software *structure*

— *clustering* in *Lucene class dependency* network [ŠŽBB14]
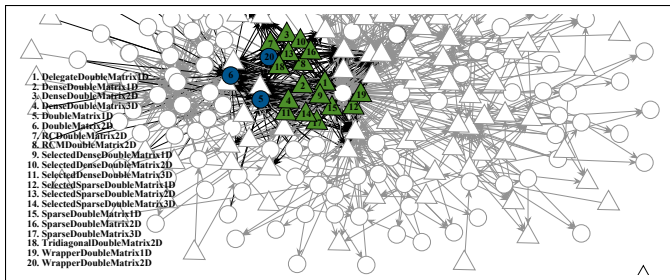— *software structure* is *scale-free* and *"small-world"* [VCS02]

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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