

applications *software*

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

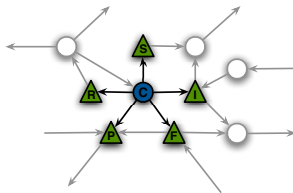
Lovro Šubelj  
University of Ljubljana  
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# software *networks*

- *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



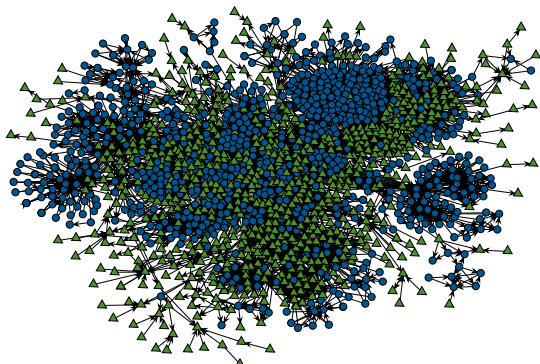
dependencies of class C

---

\* software class dependency networks encode only signatures

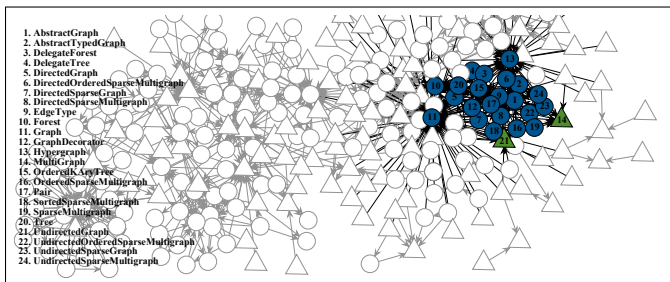
## software *structure*

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



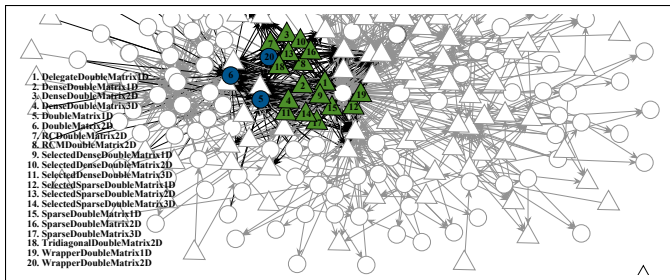
# software *clusters*

- *clusters* in *JUNG class dependency* network [ŠŽBB14]
- *communities* are *core classes of software library* [ŠB11]



# software *clusters*

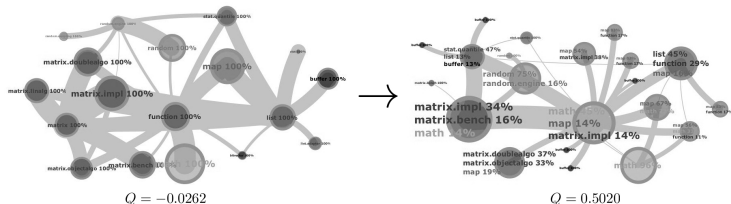
- *clusters* in *colt class dependency* network [ŠŽBB14]
- *anti-communities* are *classes with same function* [ŠB12b]





software *organization*

- *clusters* in *colt class dependency* network [ŠB11]
- *modular/functional organization* of software packages



# software *mining*

- *mining* of *JUNG class dependency* network [ŠŽBB14]
- *clusters* allow *predicting software classes metadata*

metadata	baselines		clusters
	network	<i>neighbors</i>	<i>propagation</i>
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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