Karmaşık Ağlar

NetworkX

selam

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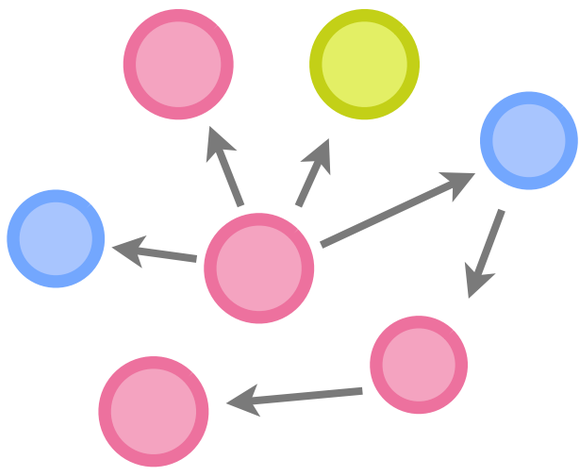
ağ=düğümküme



noktalar ve çizgiler kümesidir.

nokta	çizgi	
köşe	kenar	matematik
düğüm	bağlantı	bilgisayar bilimi
yapıtaşı	bağ	fizik
aktör	ilişki	sosyoloji

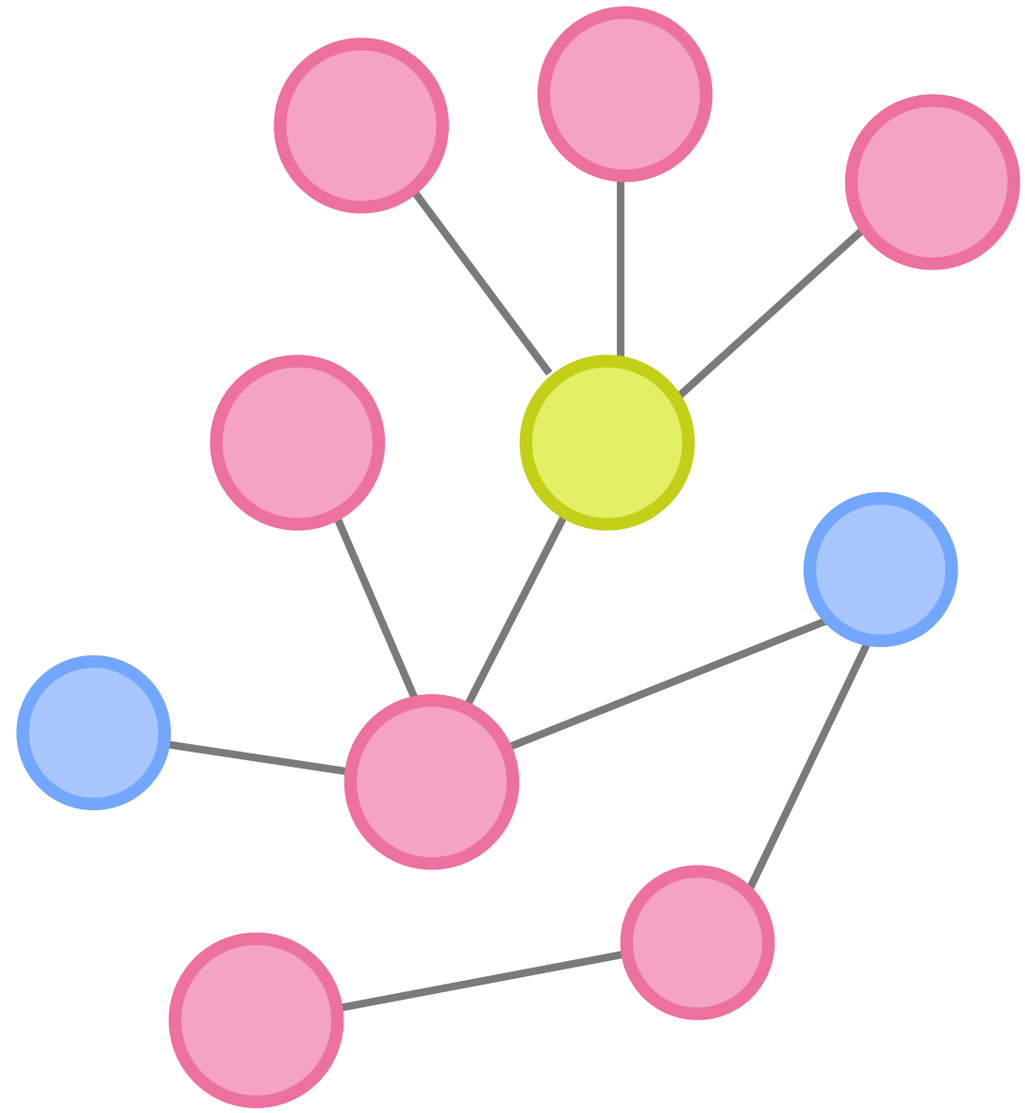
graph theory

Euler
1736
Kaliningrad köprüleri

he used graphs
before it was cool

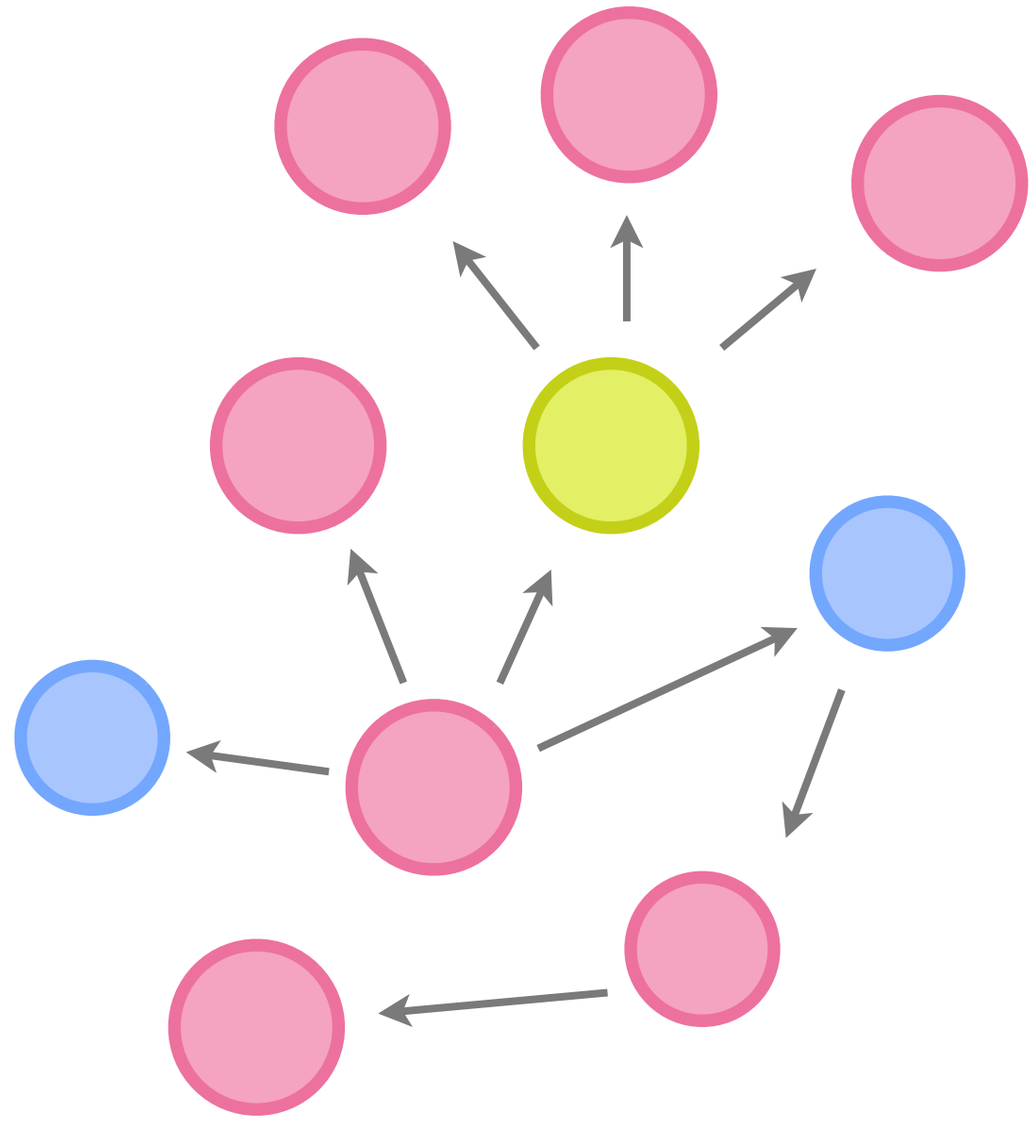
undirected

- arkadaşlıklar
- savaşmalar
- çarpışmalar
- ulaşım ağları

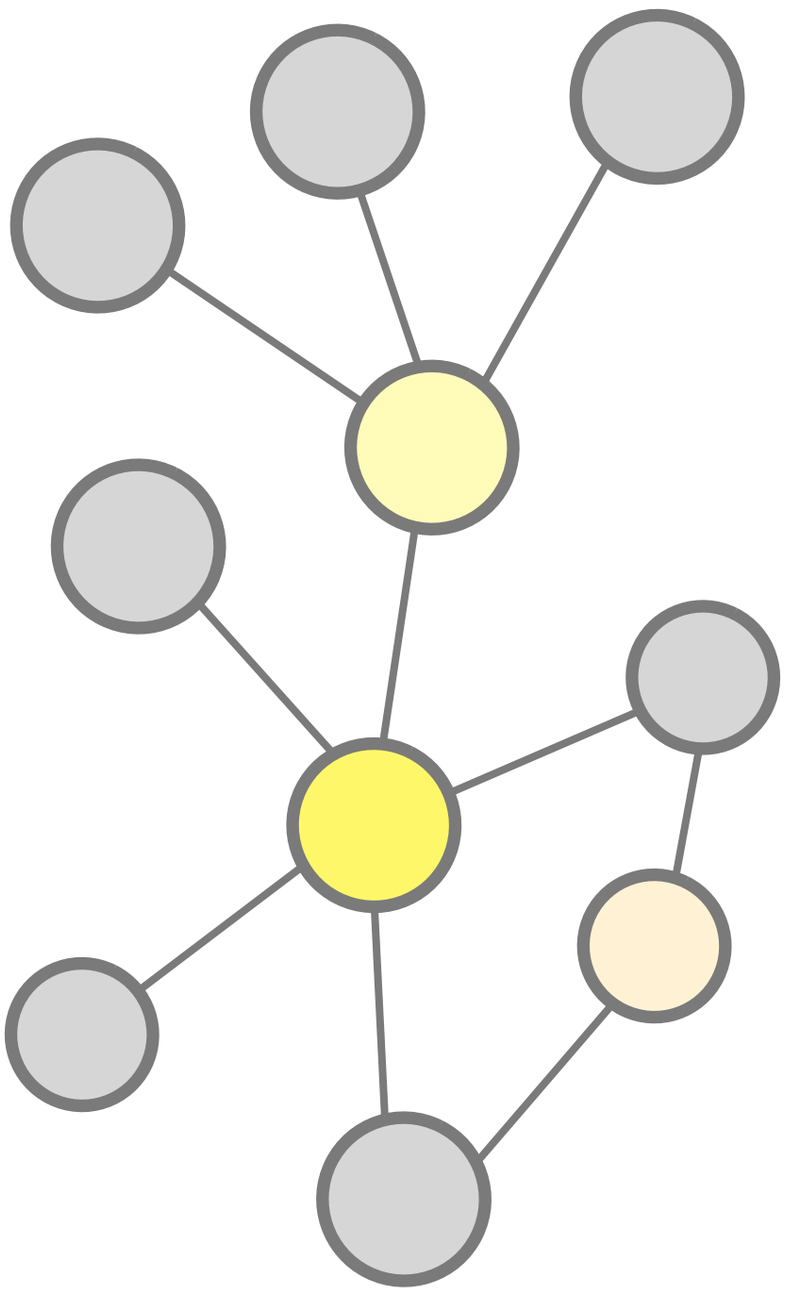


directed

- takipleşmeler
- galibiliyetler
- internet linkleri
- platonik sevgililikler

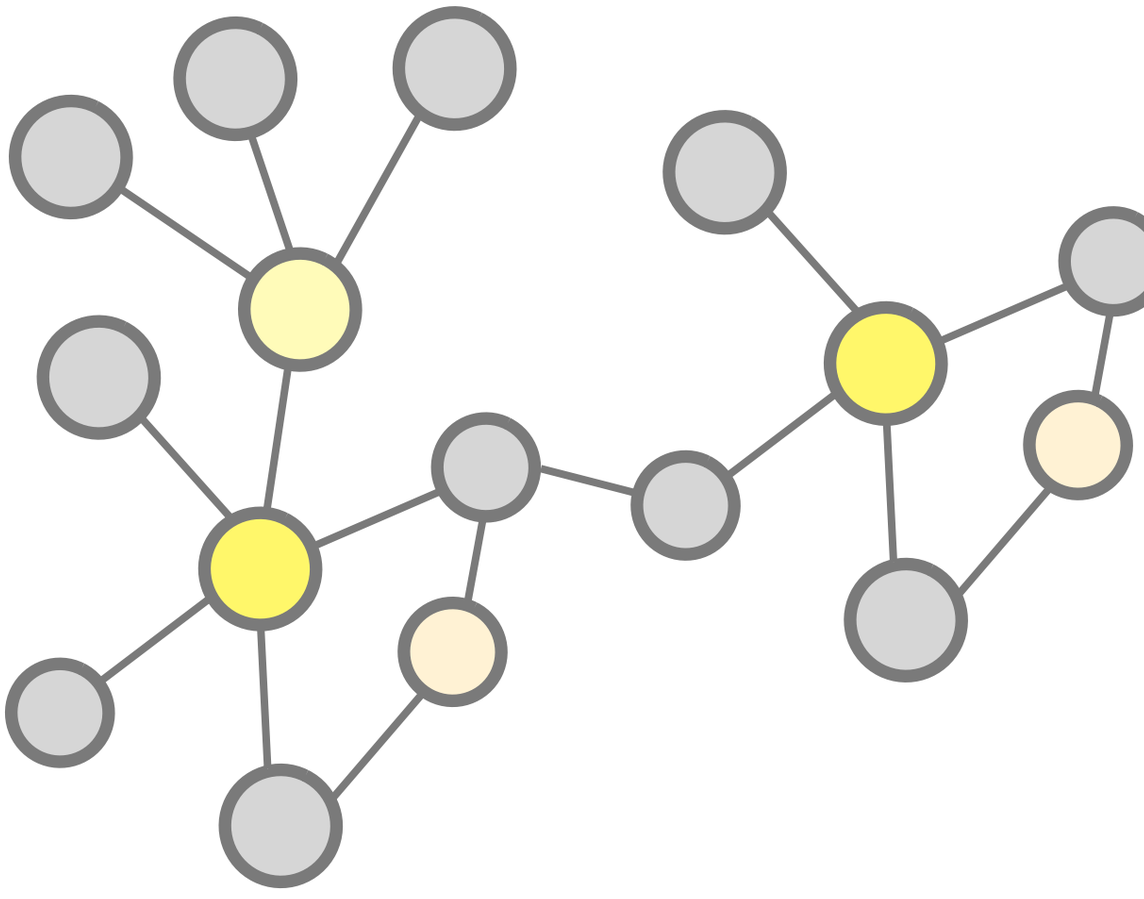


merkeziyet

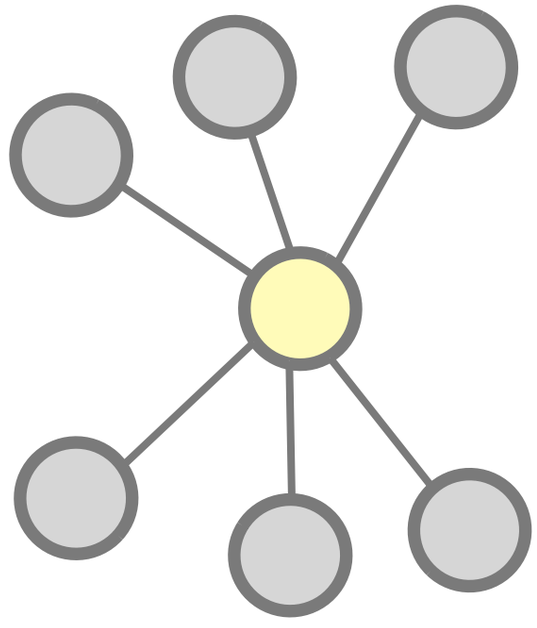


- Degree
  - In degree
  - Out degree
- Betweeness
- Closeness

topluluk

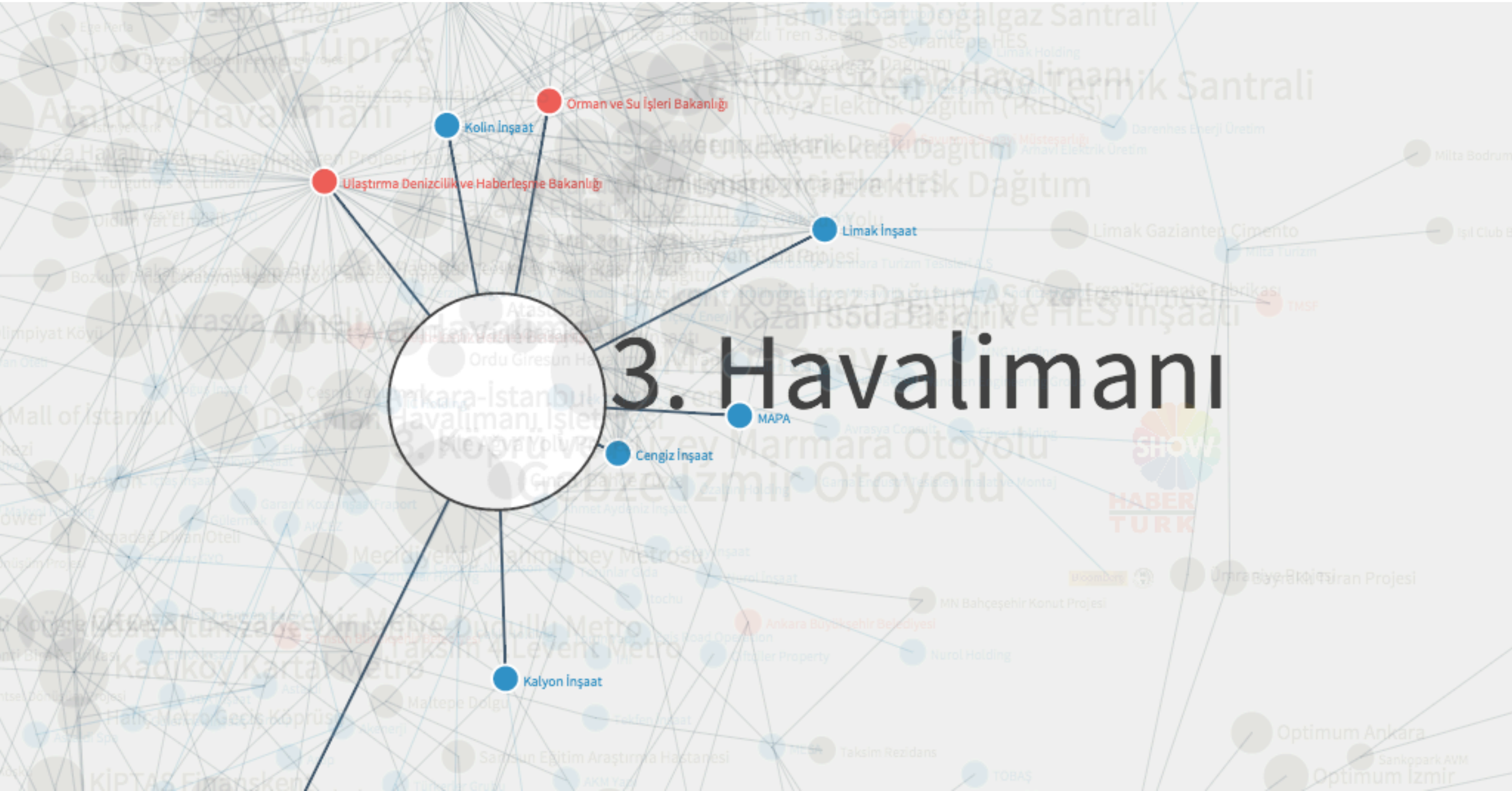


Giant
Component

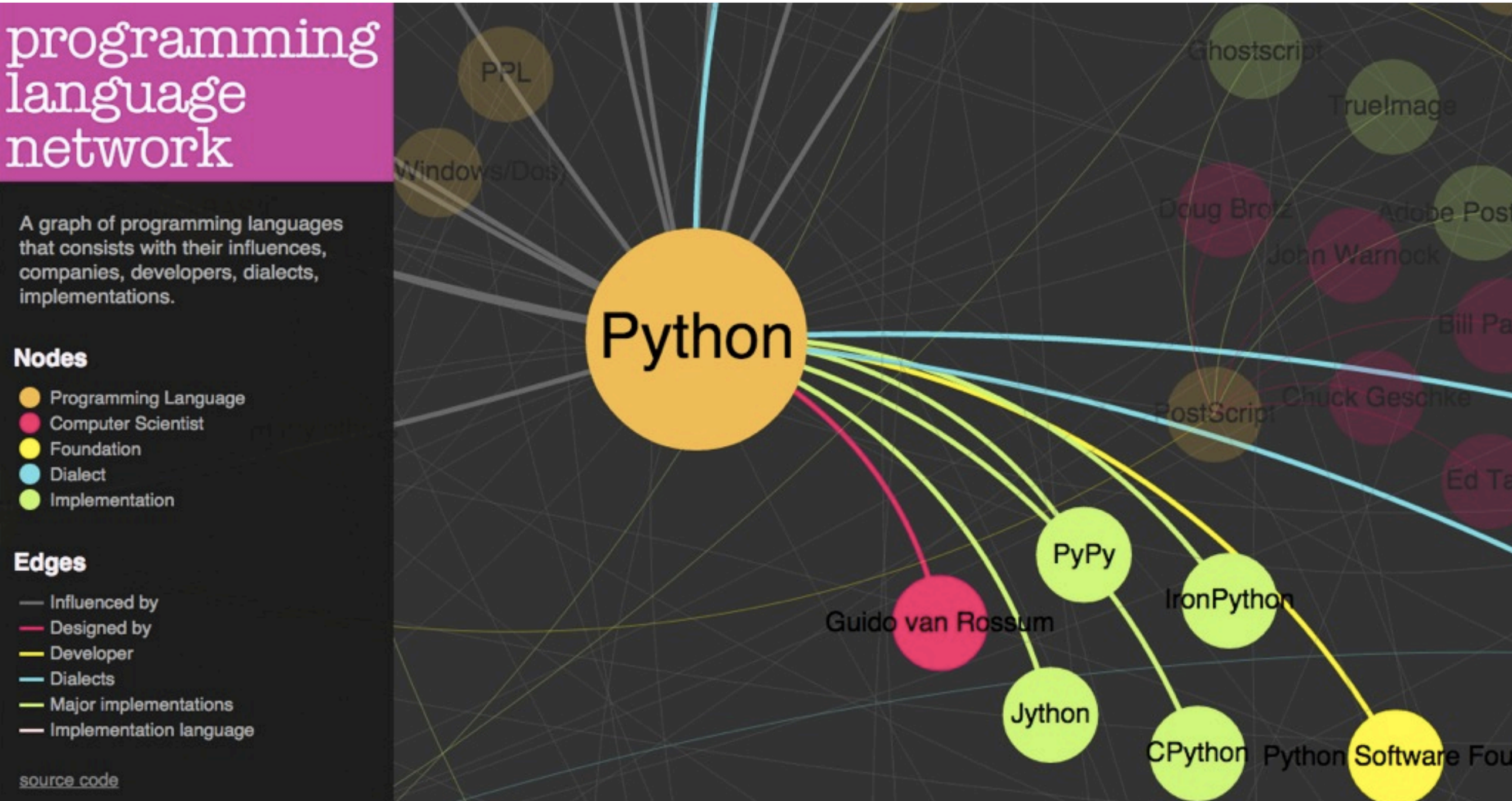


Isolated
Component

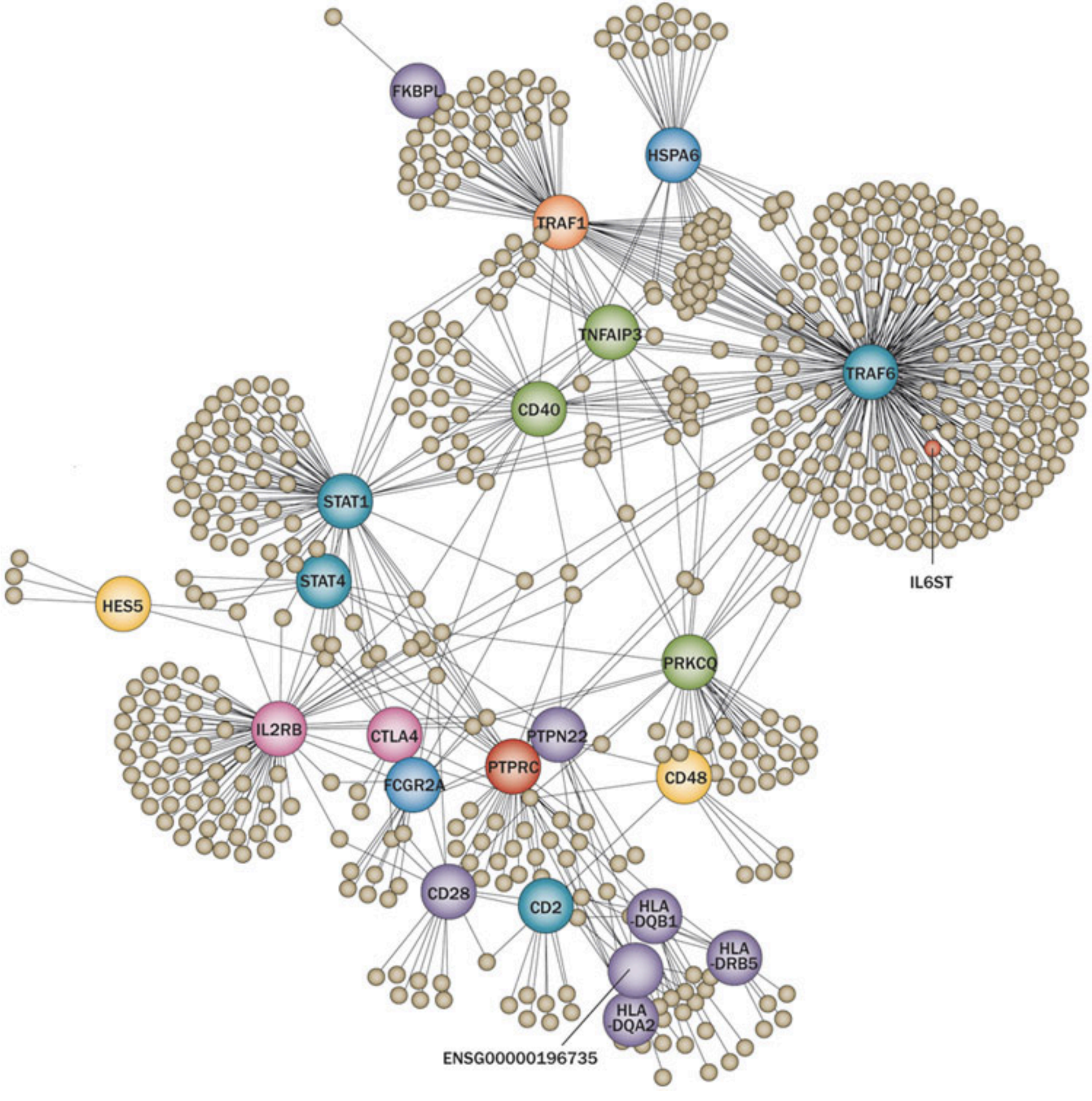
mülksüzleştime ağları

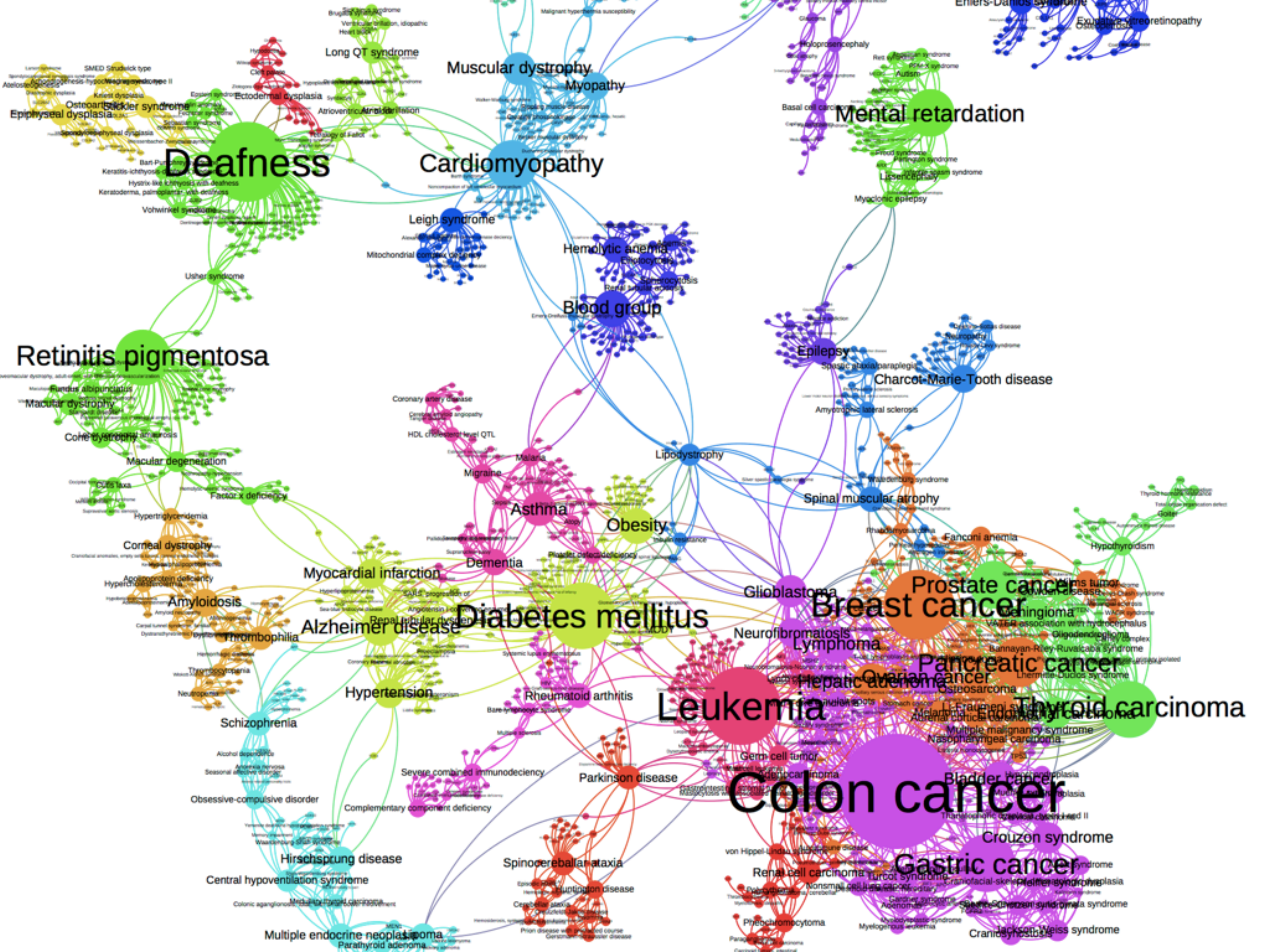


programlama dilleri ağları

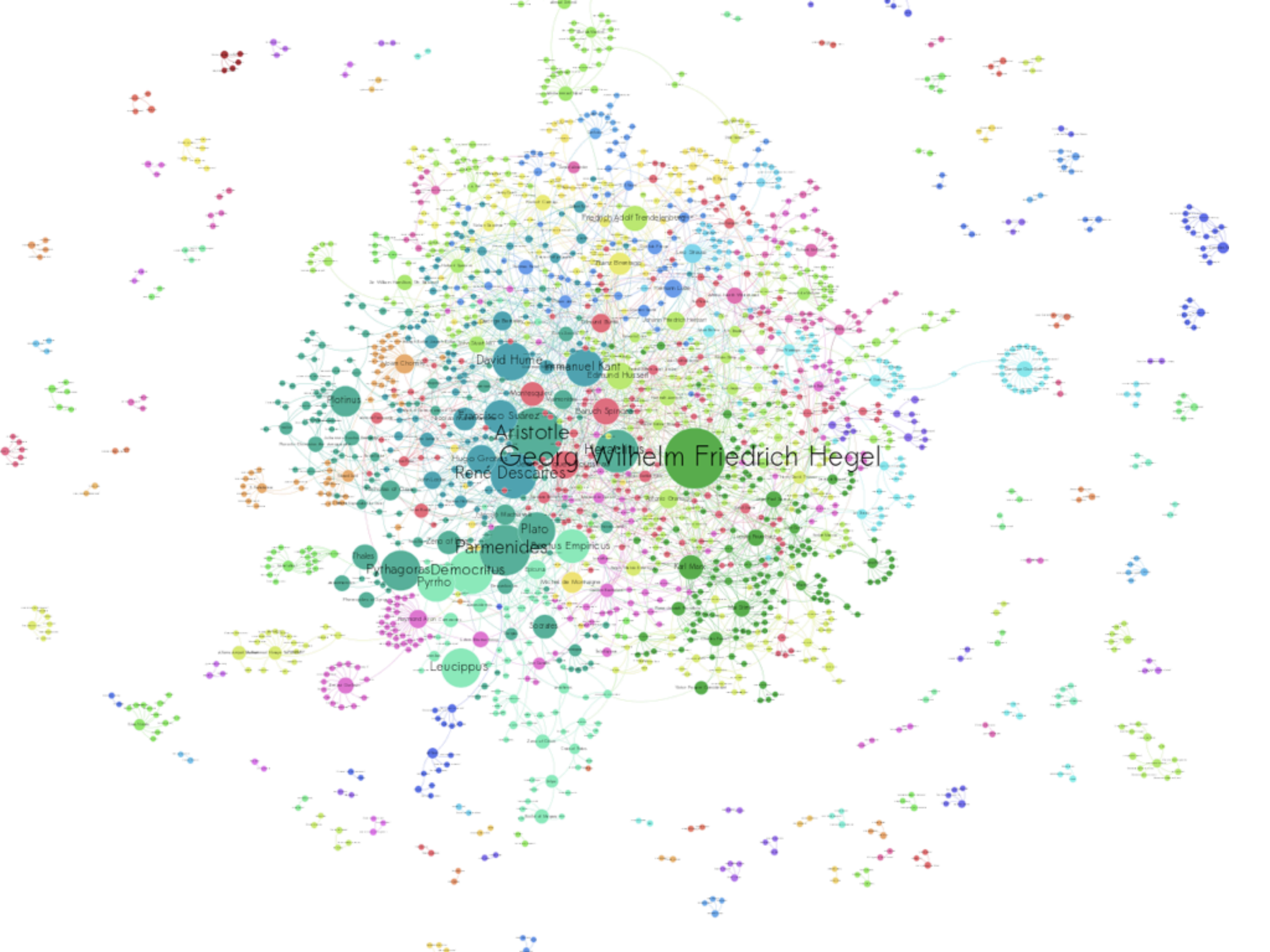


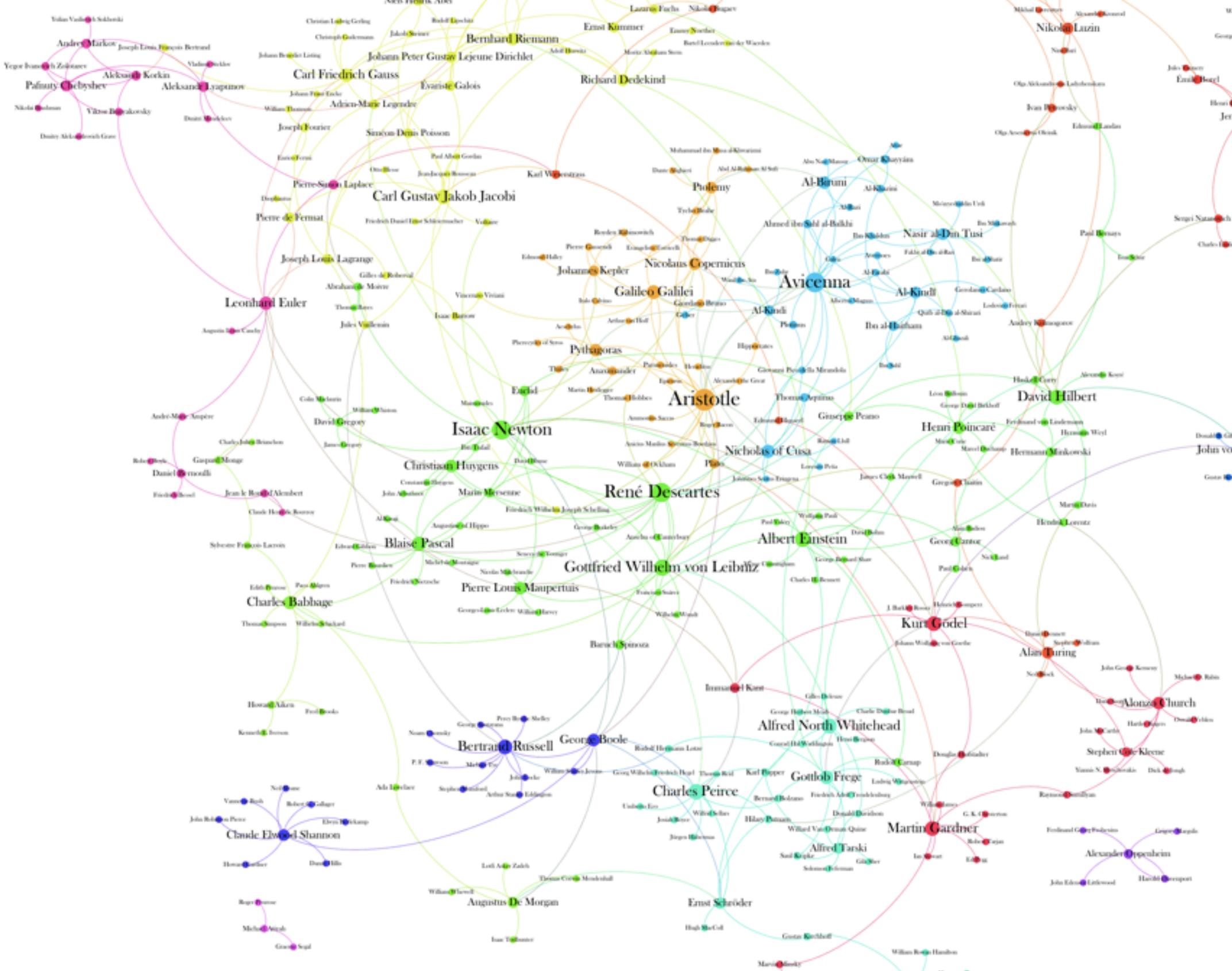
Disiplinlerarası


FKBPL
HSPA6
TRAF1
TNFAIP3
TRAF6
CD40
STAT1
STAT4
HES5
IL6ST
PRKCQ
IL2RB
CTLA4
PTPN22
PTPRC
FCGR2A
CD48
CD28
CD2
HLA
-DQB1
HLA
-DRB5
HLA
-DQA2
ENSG00000196735



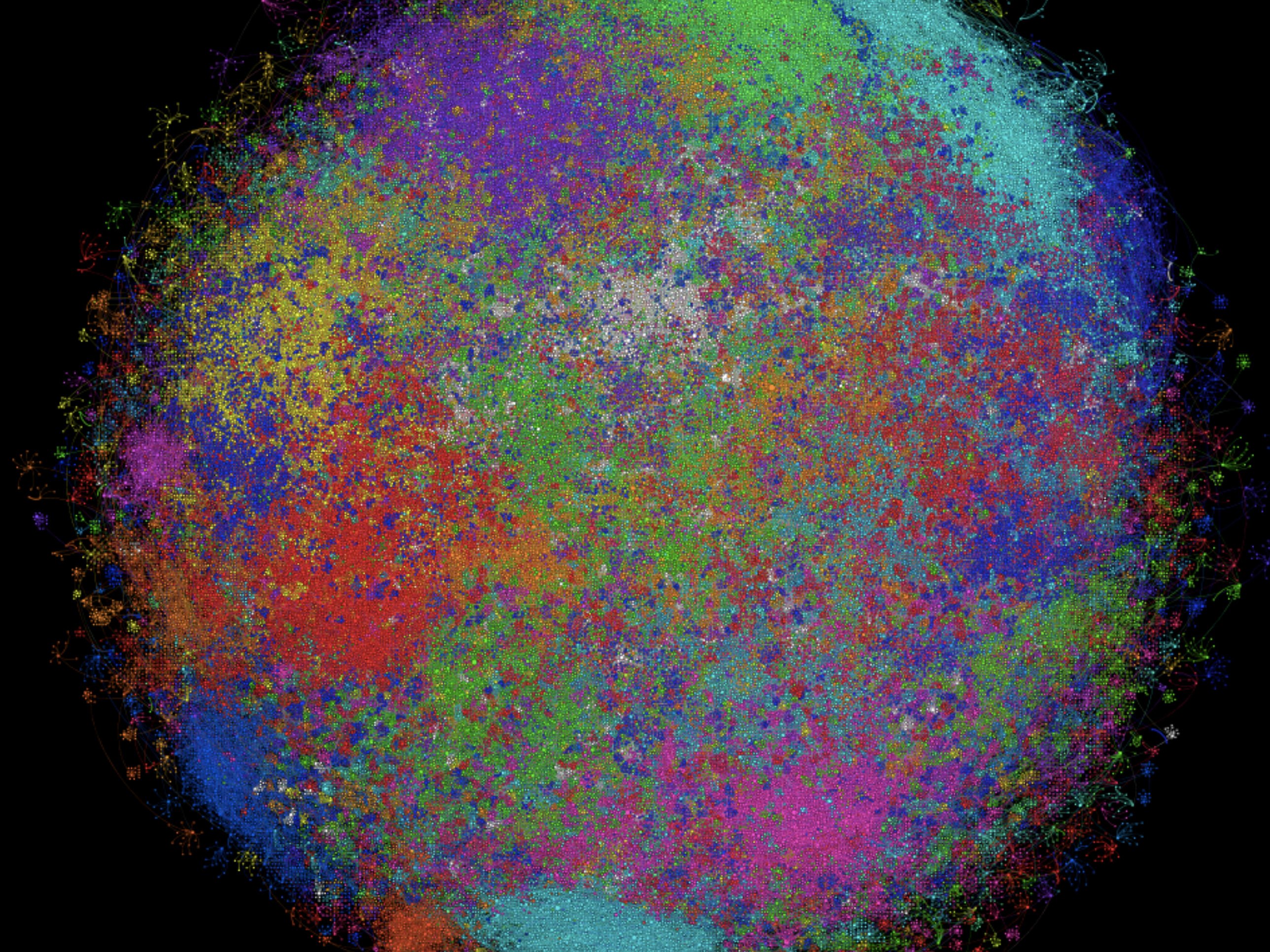
Deafness
Cardiomyopathy
Muscular dystrophy
Myopathy
Mental retardation
Long QT syndrome
Ectodermal dysplasia
Epiphyseal dysplasia
Leigh syndrome
Hemolytic anemia
Blood group
Retinitis pigmentosa
Usher syndrome
Epilepsy
Charcot-Marie-Tooth disease
Macular dystrophy
Cone dystrophy
Macular degeneration
Lipodystrophy
Spinal muscular atrophy
Asthma
Obesity
Migraine
Malaria
Dementia
Myocardial infarction
Corneal dystrophy
Amyloidosis
Thrombophilia
Diabetes mellitus
Alzheimer disease
Glioblastoma
Prostate cancer
Breast cancer
Neurofibromatosis
Lymphoma
Pancreatic cancer
Ovarian cancer
Hepatic adenoma
Hypertension
Rheumatoid arthritis
Leukemia
Thyroid carcinoma
Schizophrenia
Parkinson disease
Colon cancer
Bladder cancer
Crouzon syndrome
Gastric cancer
Hirschsprung disease
Central hypoventilation syndrome
Spinocerebellar ataxia
Renal cell carcinoma
Multiple endocrine neoplasia
Lipoma
Severe combined immunodeficiency
Complementary component deficiency
Obsessive-compulsive disorder
Fanconi anemia
Hypothyroidism
Pheochromocytoma
Huntington disease
Jackson-Weiss syndrome


Georg Wilhelm Friedrich Hegel
Aristotle
Plato
Parmenides
David Hume
Immanuel Kant
Edmund Husserl
Baruch Spinoza
Francisco Suárez
René Descartes
Hugo Grotius
Plotinus
Montesquieu
Friedrich Adolf Trendelenburg
Johann Friedrich Herbart
Karl Marx
Sextus Empiricus
Democritus
Pyrrho
Pythagoras
Thales
Leucippus
Socrates
Epicurus
Michel de Montaigne
Raymond Aron
Johann Gottlieb Fichte
Zeno of Elea



The Graph Of Mathematicians

By Brendan Griffen www.griffsgraphs.com



Empirical
and Quantitatif
which means:

Empirik
ve Kantitatif

Güzel kadınları severim
İşçi kadınları da severim
Güzel işçi kadınları
Daha çok severim

orhan veli

https://eksisozluk.com/entry/601759

karmaşık
ağlar

scale-free networks

power law distribution

sosyal ağlar

protein ağları

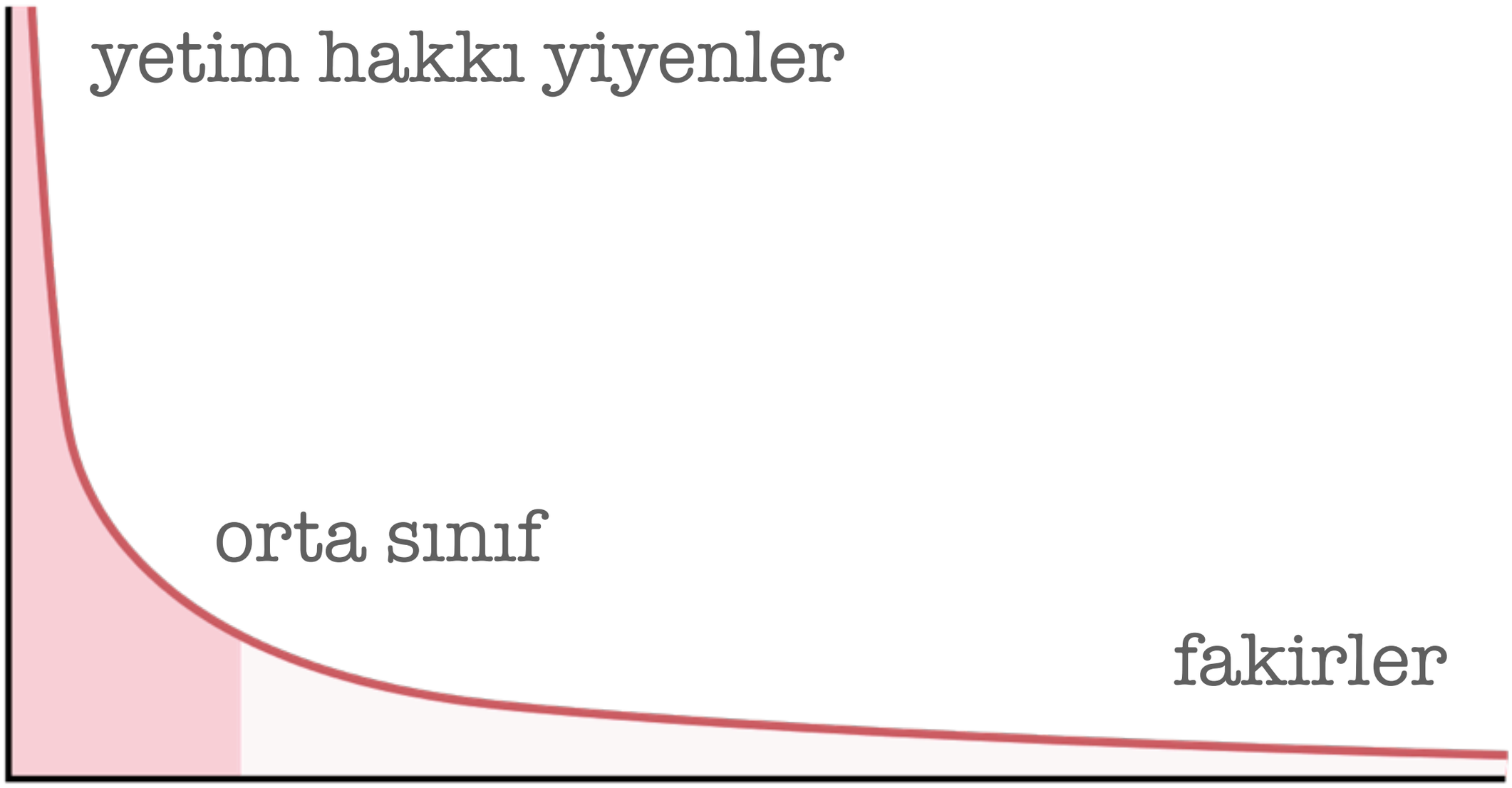
internet

sinir ağları

www

hava ulaşımı

power-law



networkx

karmaşık ağ
analiz kütüphanesi

temel kullanım

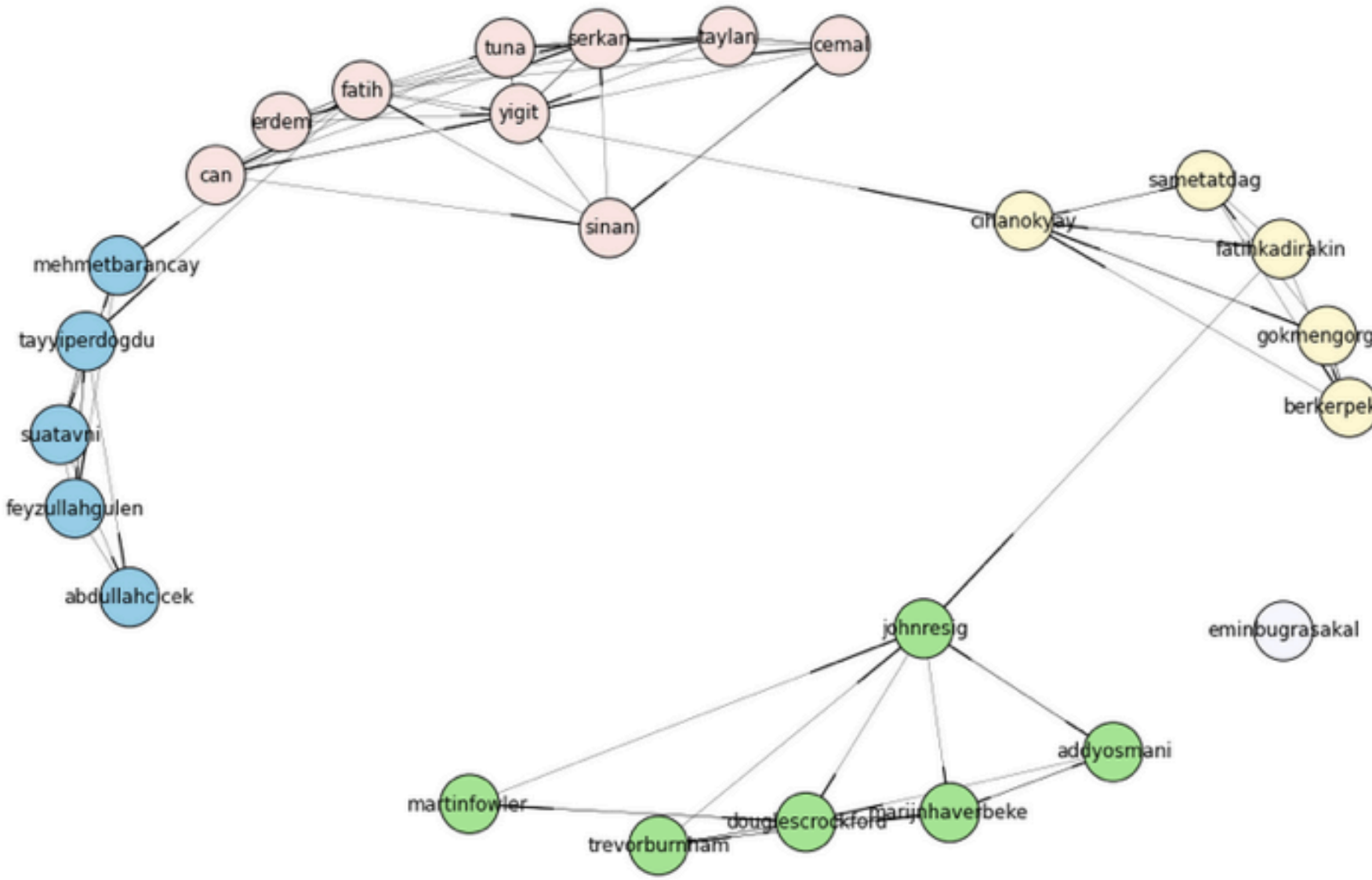
- Graph
  - DiGraph
  - MultiGraph
  - MultiDiGraph
- add_node
- add_edge

```
graph = Graph()

graph.add_node(“fatih”)

graph.add_node(“ramazan”)

graph.add_node(“fatma”)

graph.add_edge(“ramazan”, “fatih”, “brother”)

graph.add_edge(“fatma”, “fatih”, “sister”)
```

```
>>> nx.density(graph)
    0.666666666667
>>> graph.add_edge(“ramazan”, “fatma”)
>>> nx.density(graph)
    1
>>> nx.degree(“fatih”)
    2
```

```
graph.add_edge("edi", "budu")
graph.add_edge("budu", "fofo")
graph.add_edge("hede", "budu")
graph.add_edge("budu", "fofo")
>>> graph.number_connected_components()
    2
```

```
>>> list(nx.connected_components(graph))
  [
      ['fofo', 'hede', 'edi', 'budu'],
      ['fatma', 'ramazan', 'fatih']
  ]
```




```
nx.draw(graph,
        with_labels=True,
        node_size=1400,
        node_color=node_colors,
        width=0.3)
```

çözülebilecek
problemler

- Tanıyor olabileceğin kişiler
- Kaçıncı dereceden tanıyorsun
- Ortak ata problemleri
- Gruplama, Clustering
- Öneri sistemleri

kaynaklar

http://barabasilab.neu.edu

http://graphcommons.com

http://mulksuzlestirme.org

http://fatiherikli.github.io/programming-language-network

jobs@hipo.biz