# Análise de Redes

**Apresentação da Disciplina**

Prof. Patrick Terrematte

# APRESENTAÇÃO

EDUCATION PRESENTATION

# Formação

- Bacharelado em Filosofia (UFRN, 2008)
- Análise de sistemas (IFRN, 2011)
- Mestrado em Sistemas e computação (UFRN/PPgSC, 2013)
- Doutorando em Bioinformática (UFRN/PPgBioinfo, 2022)

# Linhas de pesquisa

- Informática Educacional e Ensino de Lógica
- Teoria da Informação e Aprendizagem de Máquina
- Bioinformática, Seleção de Característica, Proteômica, Modelagem Biológica
- Linguagens de programação: C, Python, R, Scilab, Octave

SigSaúde

BiOME

# Publicações

**TryLogic tutorial: An approach to learning Logic by proving and refuting**

Patrick Terrematte[1] and João Marcos[2]

**ARG: A Virtual Tool for Teaching Argumentation Theory**

Nailton Silva[1], José Moura[2], and Patrick Terrematte[3]

cancers

MDPI

*Article*

**A Novel Machine Learning 13-Gene Signature: Improving Risk Analysis and Survival Prediction for Clear Cell Renal Cell Carcinoma Patients**

Patrick Terrematte [1,2,*], Dhiego Souto Andrade [1], Josivan Justino [1,3], Beatriz Stransky [1,4], Daniel Sabino A. de Araújo [1] and Adrião D. Dória Neto [1,5]

BMC Bioinformatics

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**GENTLE: a novel bioinformatics tool for generating features and building classifiers from T cell repertoire cancer data**

Dhiego Souto Andrade, Patrick Terrematte, César Rennó-Costa, Alona Zilberberg & Sol Efroni

*BMC Bioinformatics* **24**, Article number: 32 (2023) | Cite this article

IEEE Access

Multidisciplinary | Rapid Review | Open Access Journal

Received 10 August 2022, accepted 22 August 2022, date of publication 26 August 2022, date of current version 2 September 2022.

*Digital Object Identifier 10.1109/ACCESS.2022.3201897*

METHODS

**dbPepVar: A Novel Cancer Proteogenomics Database**

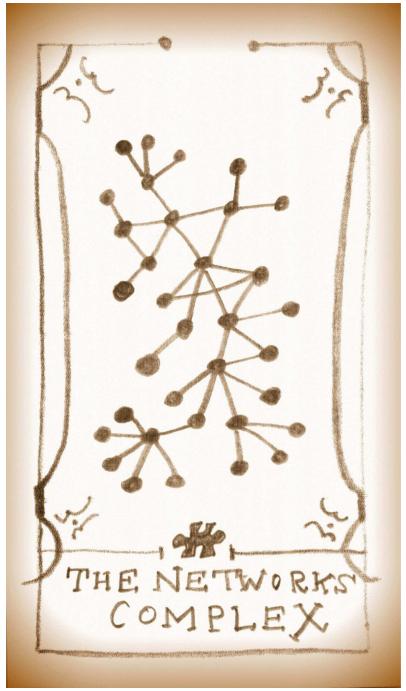
LUCAS MARQUES DA CUNHA[1,2], PATRICK TERREMATTE[1,3], TAYNÁ DA SILVA FIÚZA[1], VANDECLÉCIO LIRA DA SILVA[1,4], JOSÉ EDUARDO KROLL[1,5], SANDRO JOSÉ DE SOUZA[1,6], AND GUSTAVO ANTÔNIO DE SOUZA[1,7]

# A Disciplina

- Horário para Atendimento:
  - Discord: https://discord.gg/YeHZdW3fk9
  - Email: patrickt@imd.ufrn.br
  - Horário de Atendimento:
    - Quartas e Sextas das 15h às 17h, Sala A124, sob agendamento.
    - Envie email para agendar previamente
      - **Enviar com prefixo "[Análise de Rede]" no título do email**

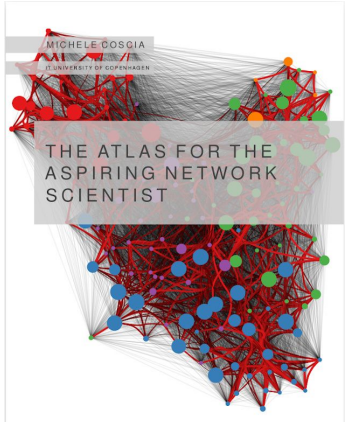
# A Disciplina

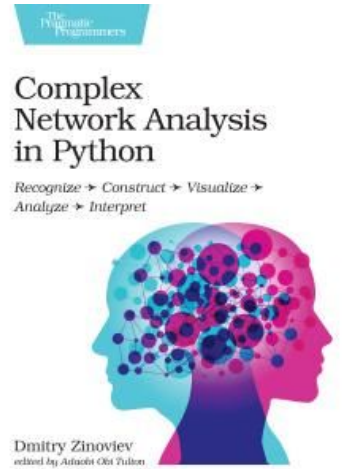
- Elementos de redes:
  - definições básicas, densidade, esparcidade, subredes, graus, e representações.
- Small worlds
  - Assortatividade, Caminhos, Distâncias, Componentes de conexões, Coeficientes de clustering.
- Hubs
  - Distribuições de centralidade, Decomposição, Betweennes, Eigenvector Centrality.
- Aplicações
  - Estudo de caso da Wikipedia
  - Estudo de caso do Twitter



# A Disciplina

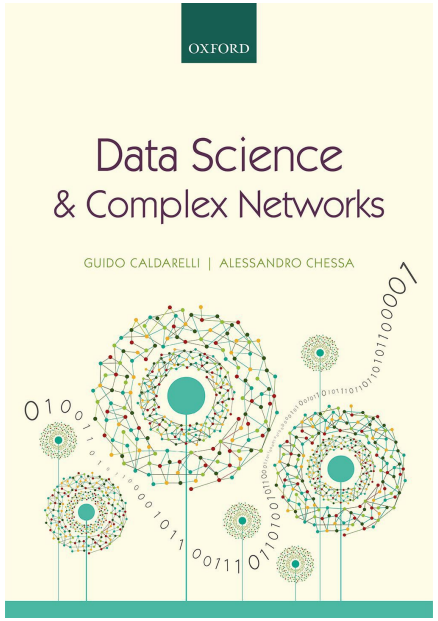
- The Atlas for the Aspiring Network Scientist, 2021
  - https://www.networkatlas.eu/index.htm
- Complex Network Analysis in Python, 2018
  - https://pragprog.com/titles/dzcnapy/complex-network-analysis-in-python/



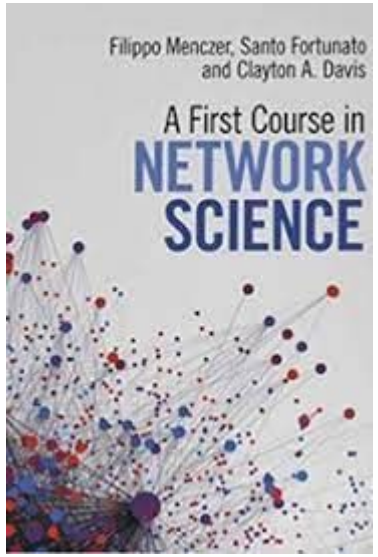



# A Disciplina

- Caldarelli, Guido; Chessa, Alessandro. **Data science and complex networks - Real cases studies with Python**, 2016.




- Filippo Menczer; Santo Fortunato; Clayton A. Davis. **A First Course in Network Science**, 2020.



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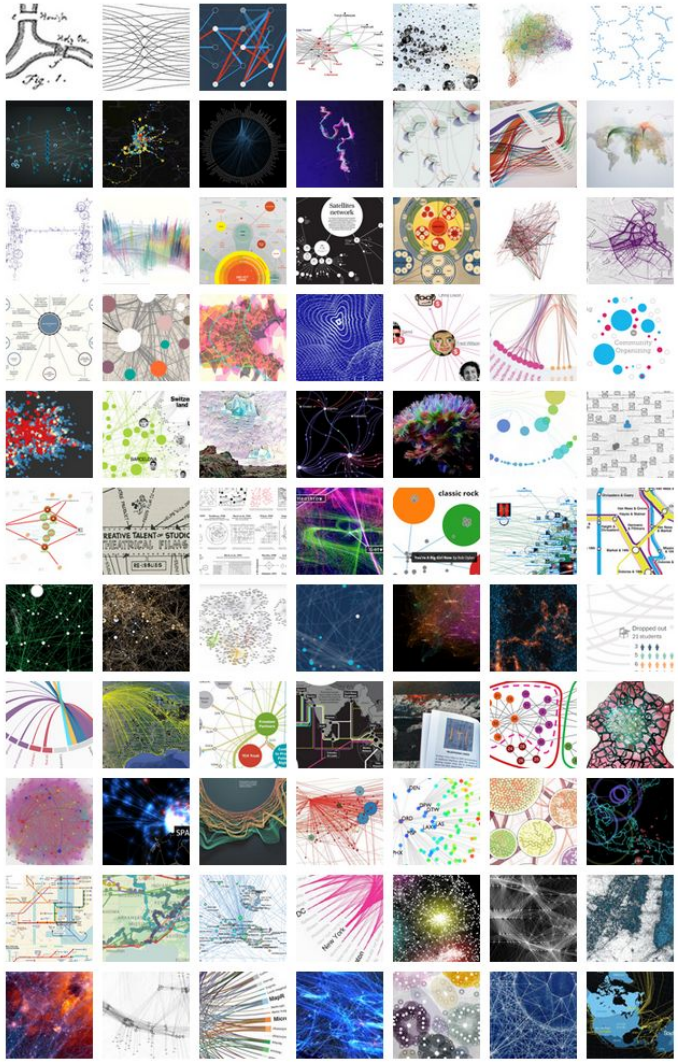
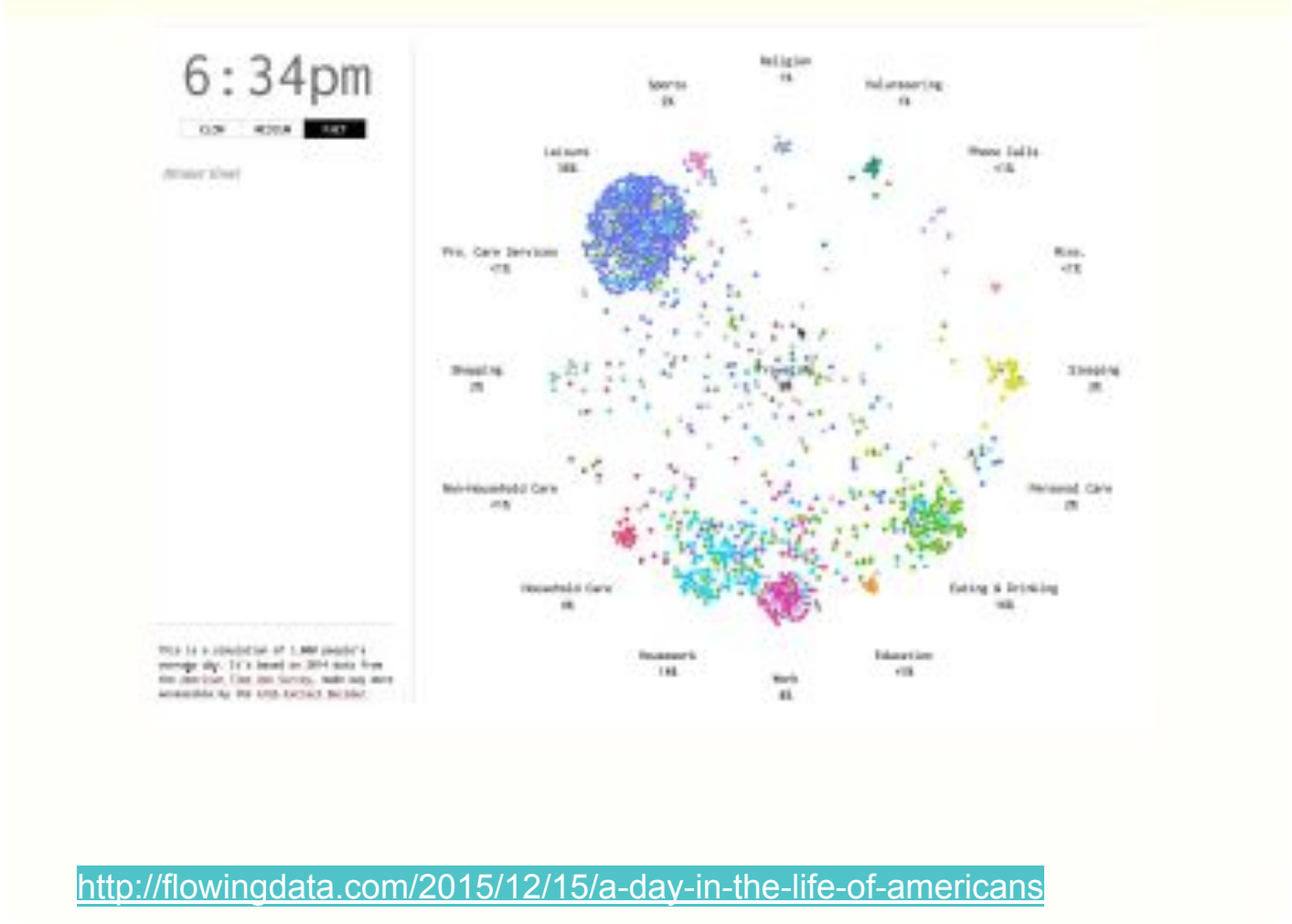
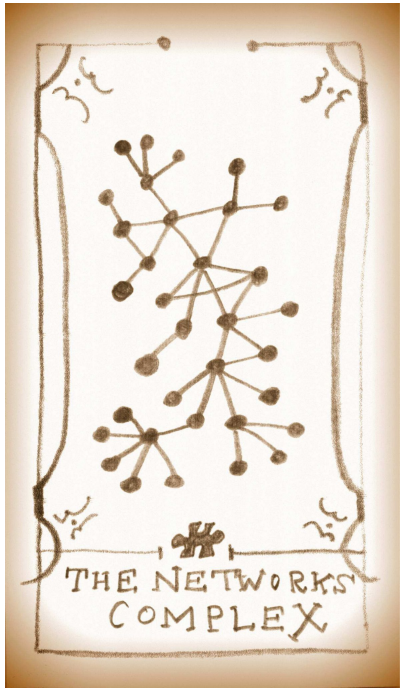


http://www.visualcomplexity.com/vc/

# A Disciplina




http://flowingdata.com/2015/12/15/a-day-in-the-life-of-americans

# Dataquest

https://www.dataquest.io/course/git-and-vcs/



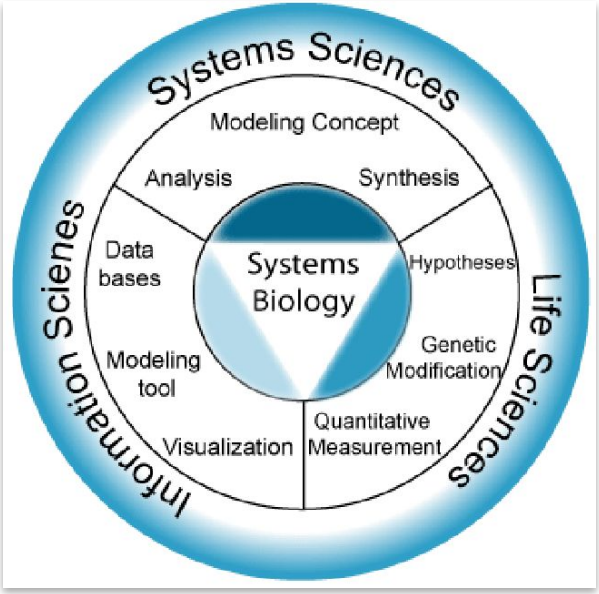
# Biologia de Sistemas como aplicação de Teoria dos Grafos

- *"The **reductionist approach** has successfully identified most of the components and many of the interactions but, unfortunately, offers **no convincing concepts** or methods to understand **how system properties emerge**..."*
- ***Sauer et al., 2007***

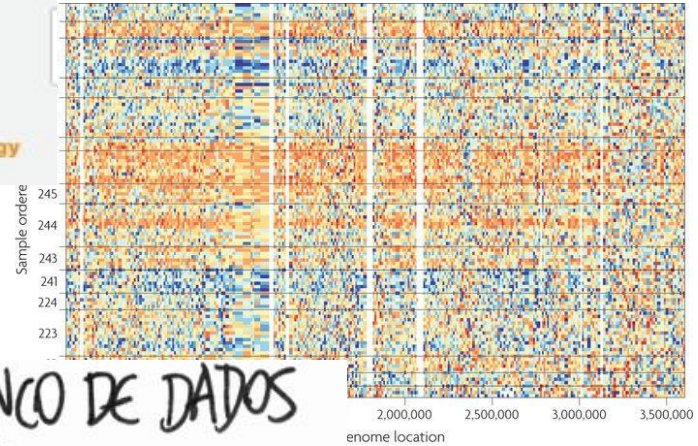
- *"**Systems biology**...is about **putting together** rather than taking apart, integration rather than reduction. It requires that we develop ways of **thinking about integration** that are as rigorous as our reductionist programmes, but different....It means changing our philosophy, in the full sense of the term."*
- ***Denis Noble, 2006***

# Biologia de Sistemas como aplicação de Teoria dos Grafos

- Grande quantidade de **dados experimentais**.
- Proposição de **modelos matemáticos** que explicam aspectos significativos dos dados.
- **Simulações computacionais** e análises numéricas.
- Avaliação da qualidade do modelo por comparação dos resultados com dados experimentais.

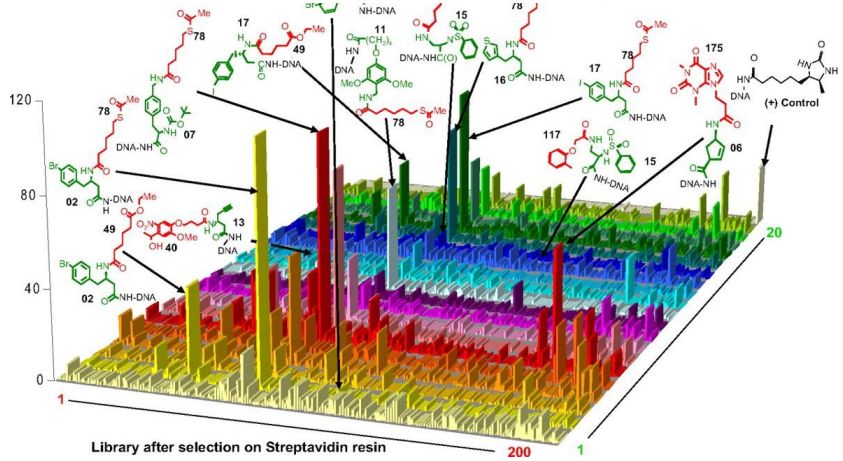


RCSB PDB
PROTEIN DATA BANK
An Information Portal to 114080 Biological Macromolecular Structures
PDB-101 · WORLDWIDE PDB · EMDataBank · NDB NUCLEIC ACID DATABASE · StructuralBiology Knowledgebase

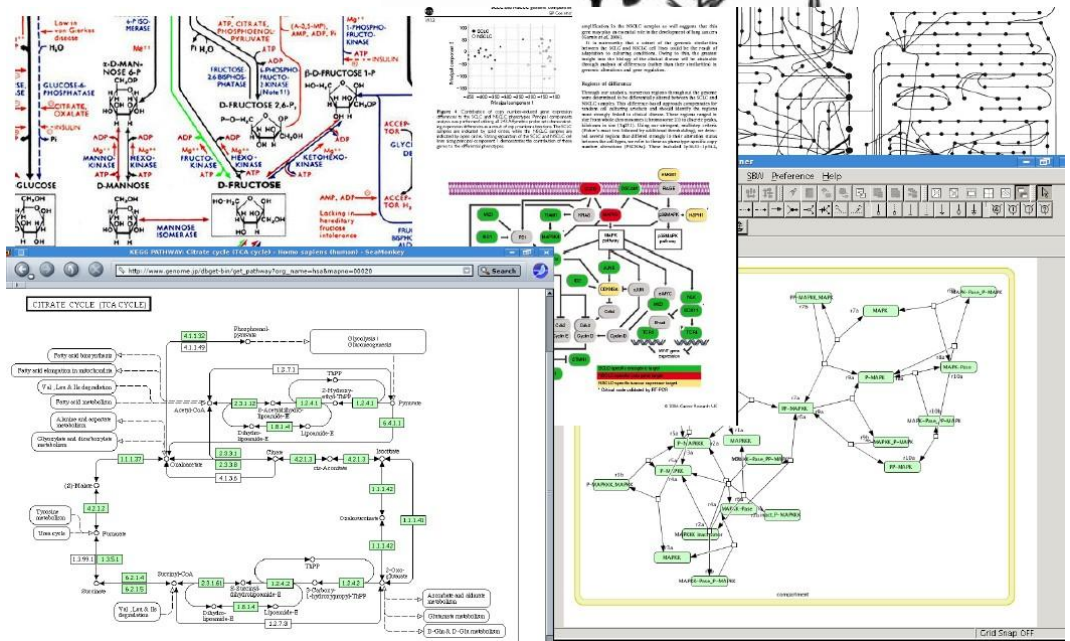



FlyBase
FB2015_04, released September 3, 2015
A Database of *Drosophila* Genes & Genomes

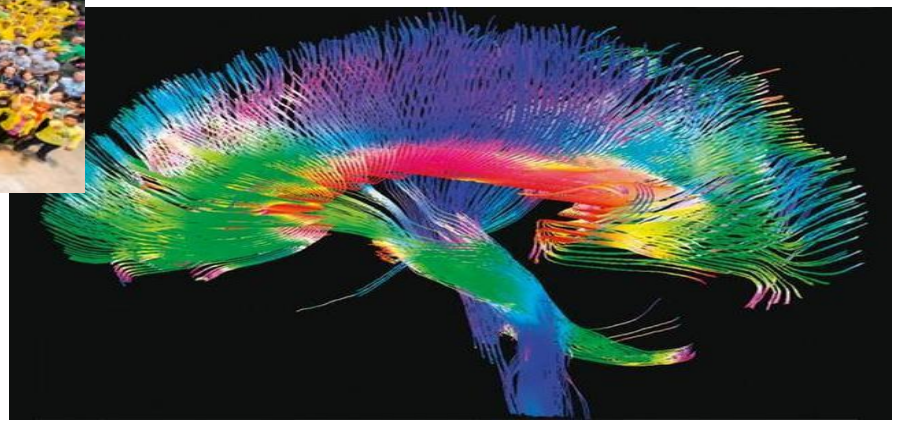
Home | Tools | Downloads | Links | Community | Species | About | Help | Archives | Jump to Gene | Go

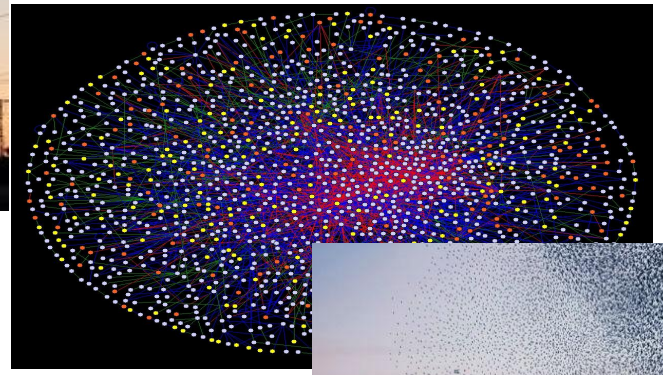





# Sistemas complexos como aplicação de Teoria dos Grafos





## Próxima aula...

# Teoria de Grafos

- Propriedades
  - Ordem e Tamanho
  - Caminhos e medidas
  - Grau e Distribuição de Grau
  - Coeficiente de Clusterização
  - Medidas de Centralidade
- Tipos de Redes
  - Redes Aleatórias
  - Redes 'Mundo Pequeno' (*Small Worlds*)
  - Redes Livre de Escala