

# Student project: Gene networks via PascalX

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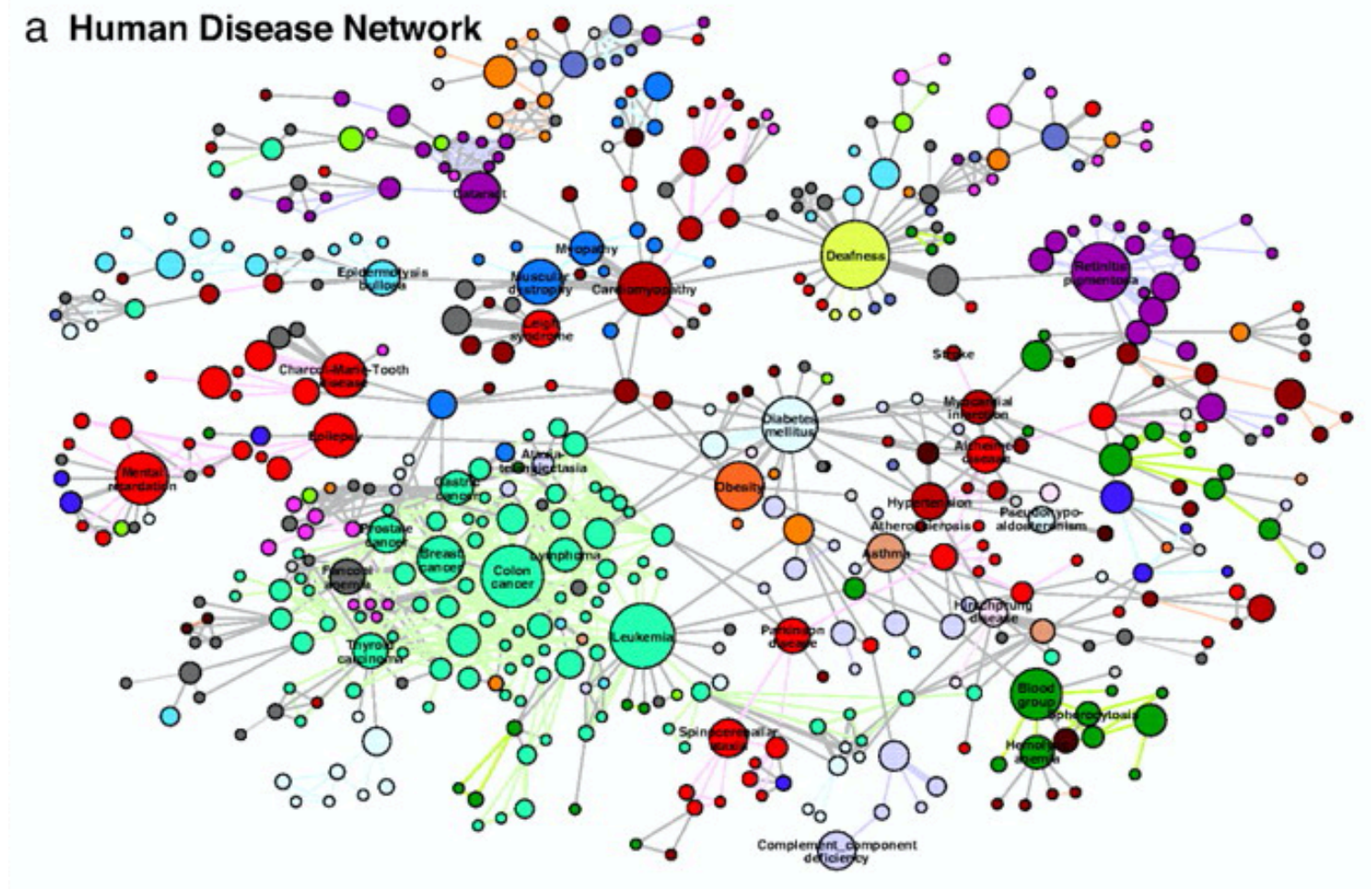
# Motivation



## Human disease network

( Goh et al '07: The human disease network )

Via harvesting known Gene-Disease relations networks can be constructed and clustered:



( from Goh et al PNAS '07: The human disease network )



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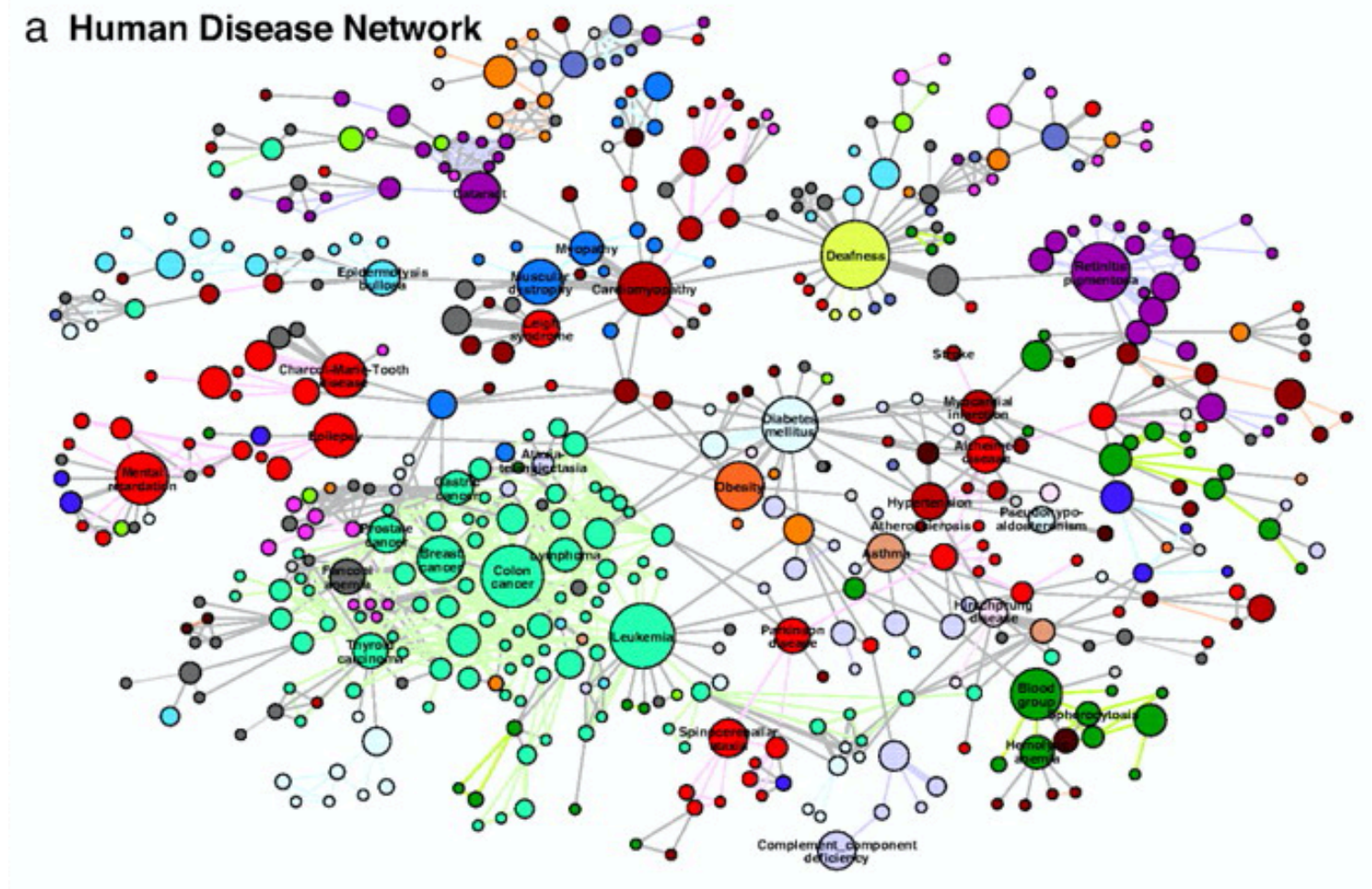
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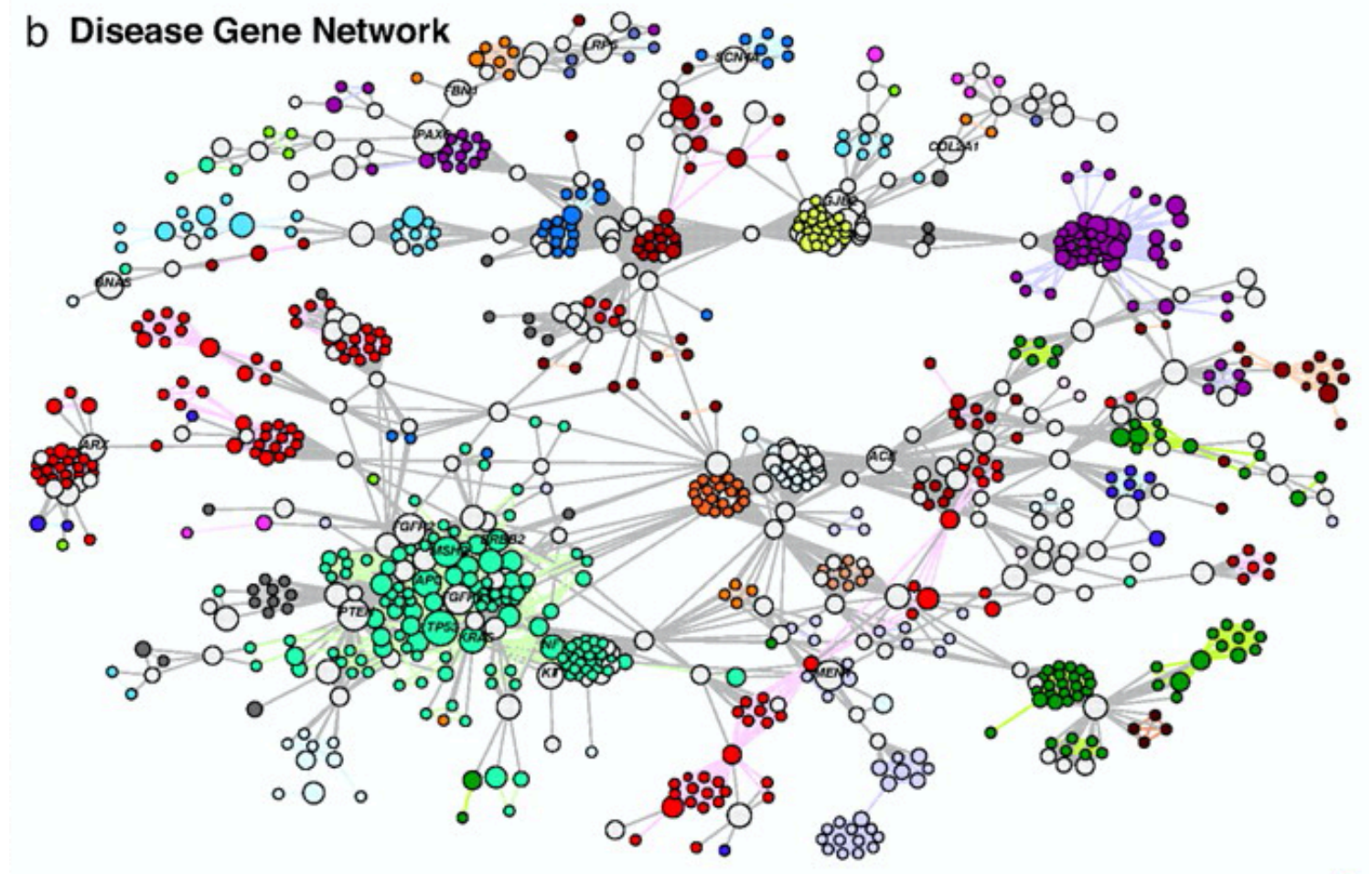
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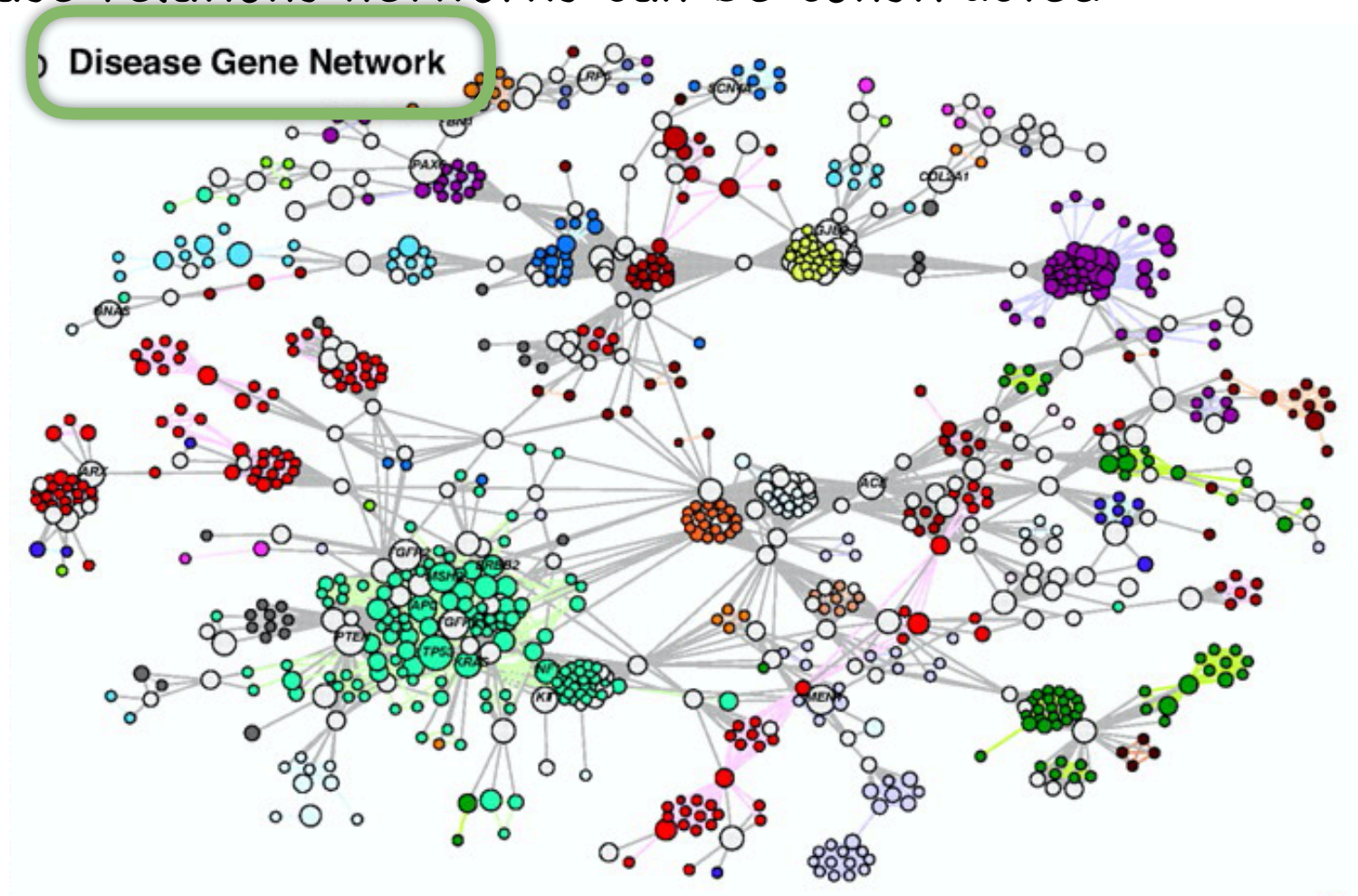
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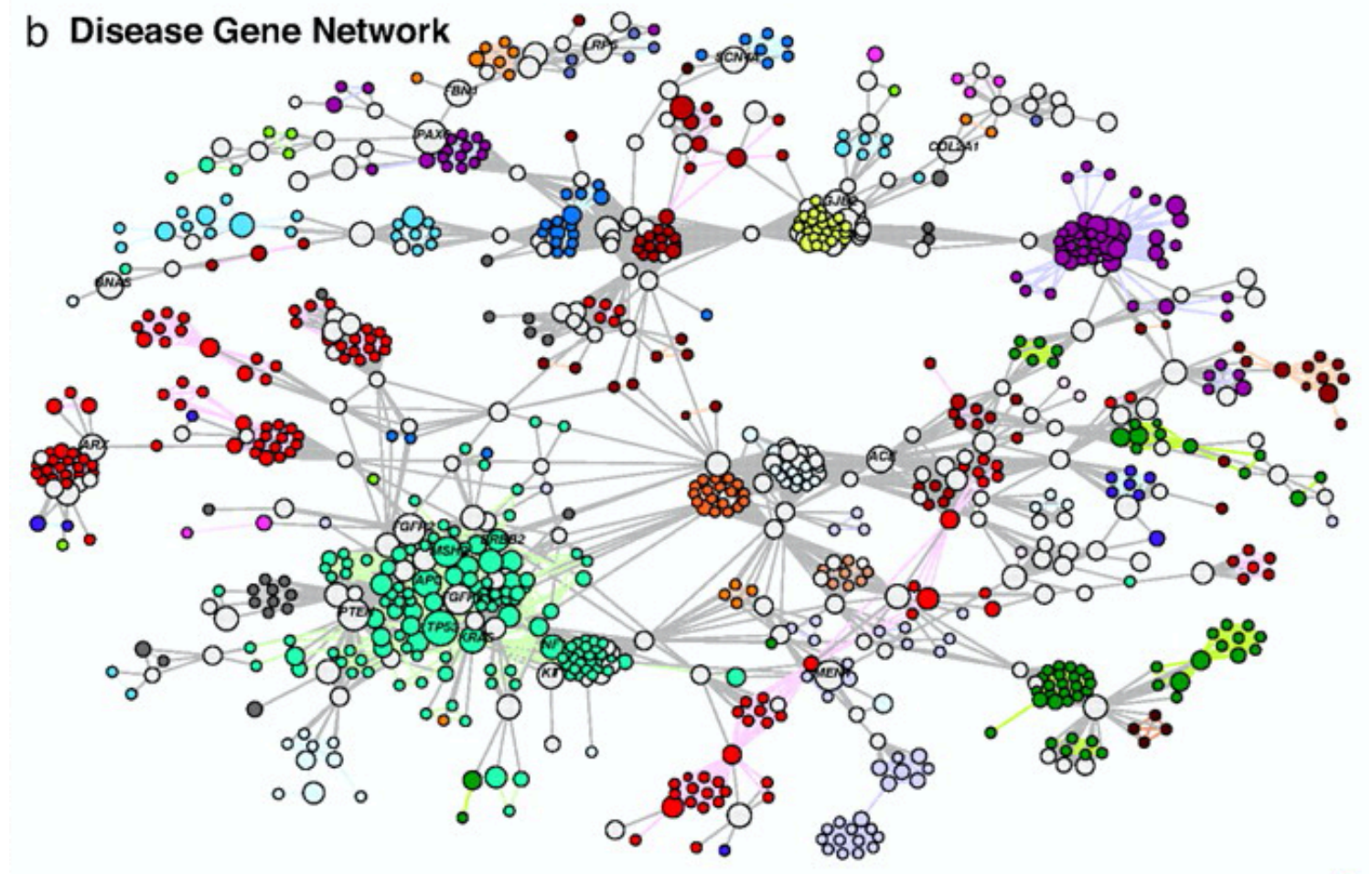
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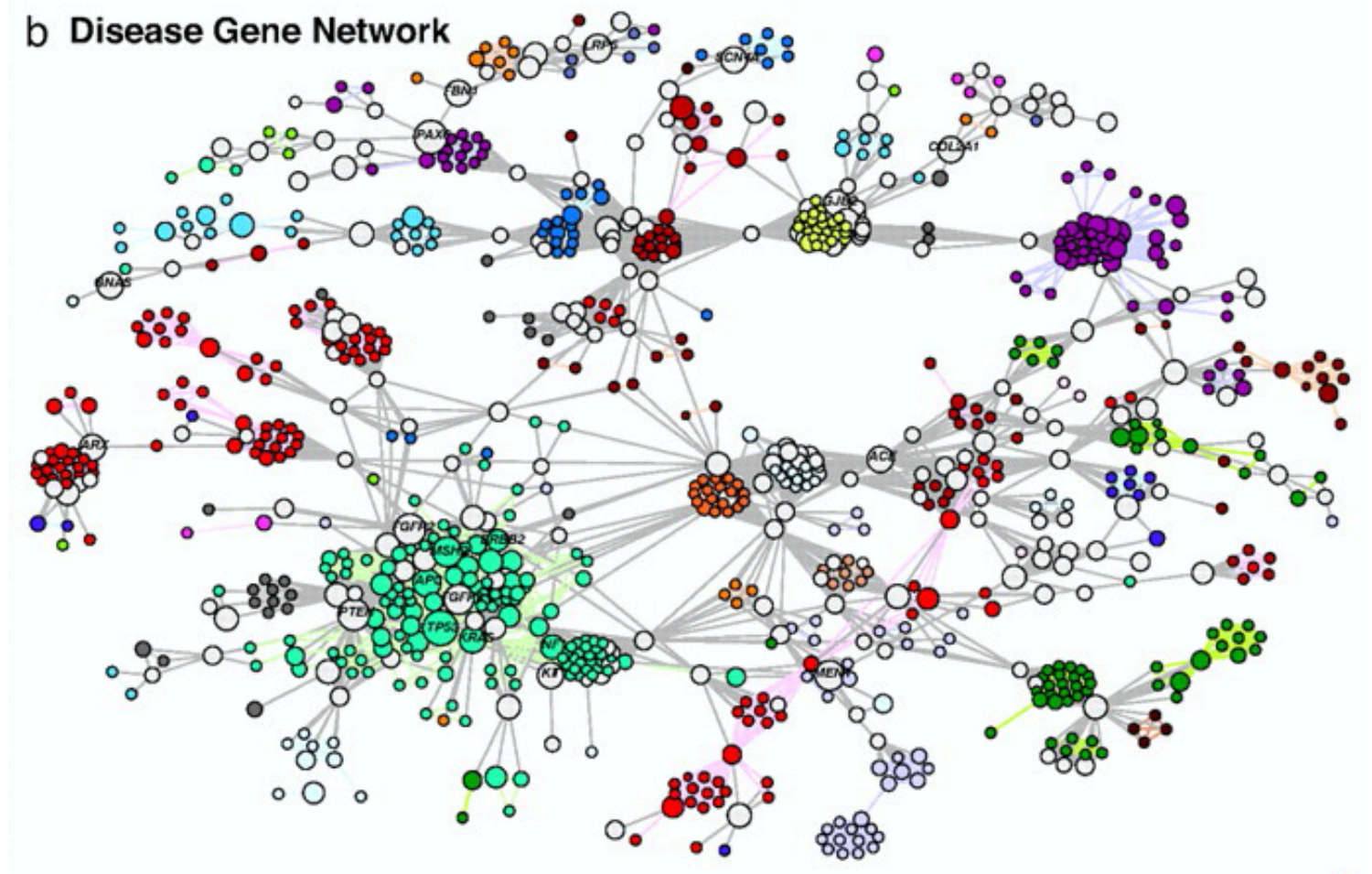


## Human disease network

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Disease-gene networks yield novel insights:

- Shared genetic origins of diseases
- Multi-pathway association of diseases
- Disfunction of shared functional modules



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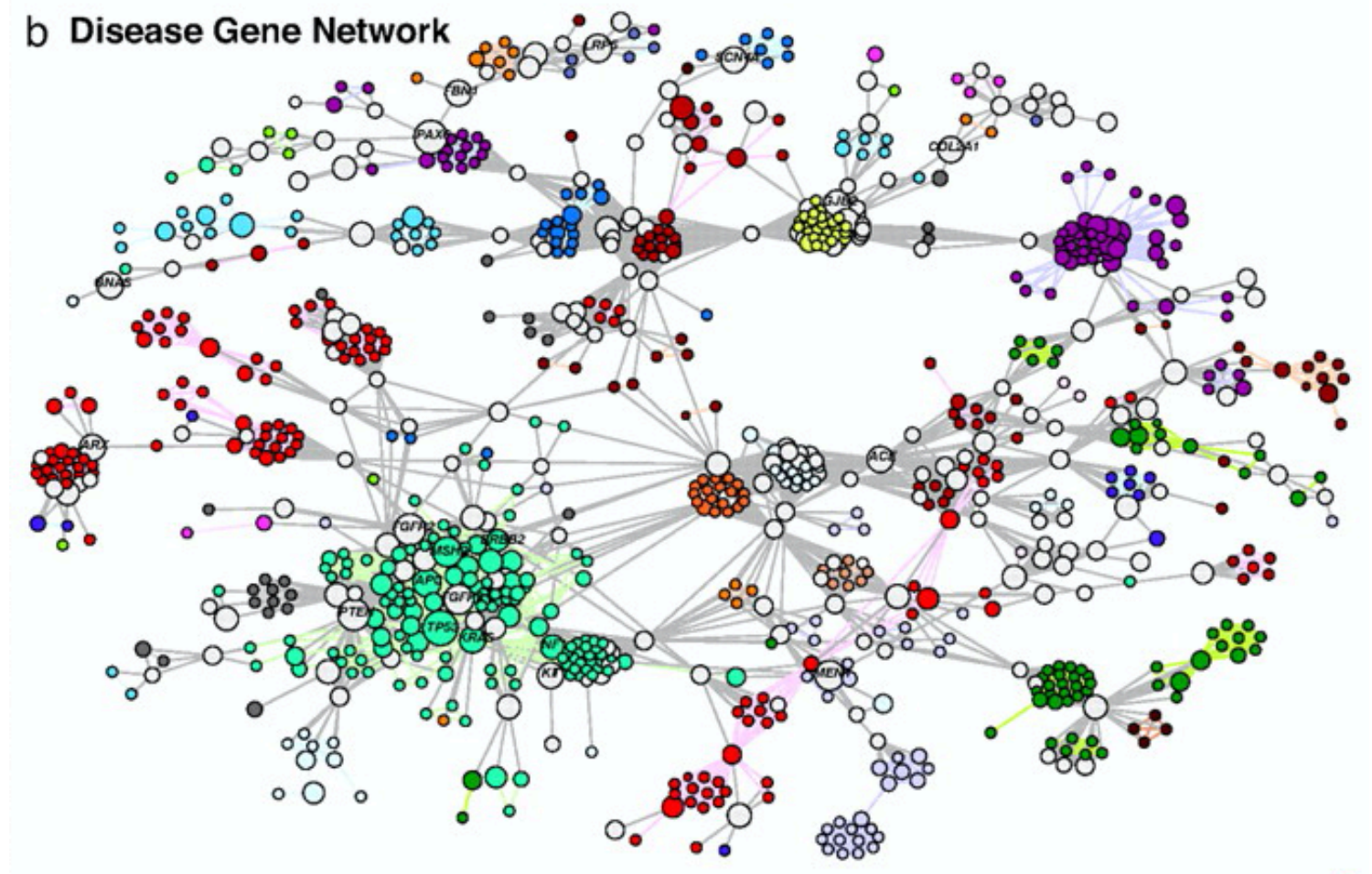
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Good first read:

Bauer-Mehren et al.,  
Gene-disease network analysis reveals functional  
modules in mendelian, complex and environmental  
diseases

Disease-gene networks have applications:

- Predict adverse drug reactions
- Predict new disease related genes
- Drug repurposing
- Identify shared mechanisms



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# Project

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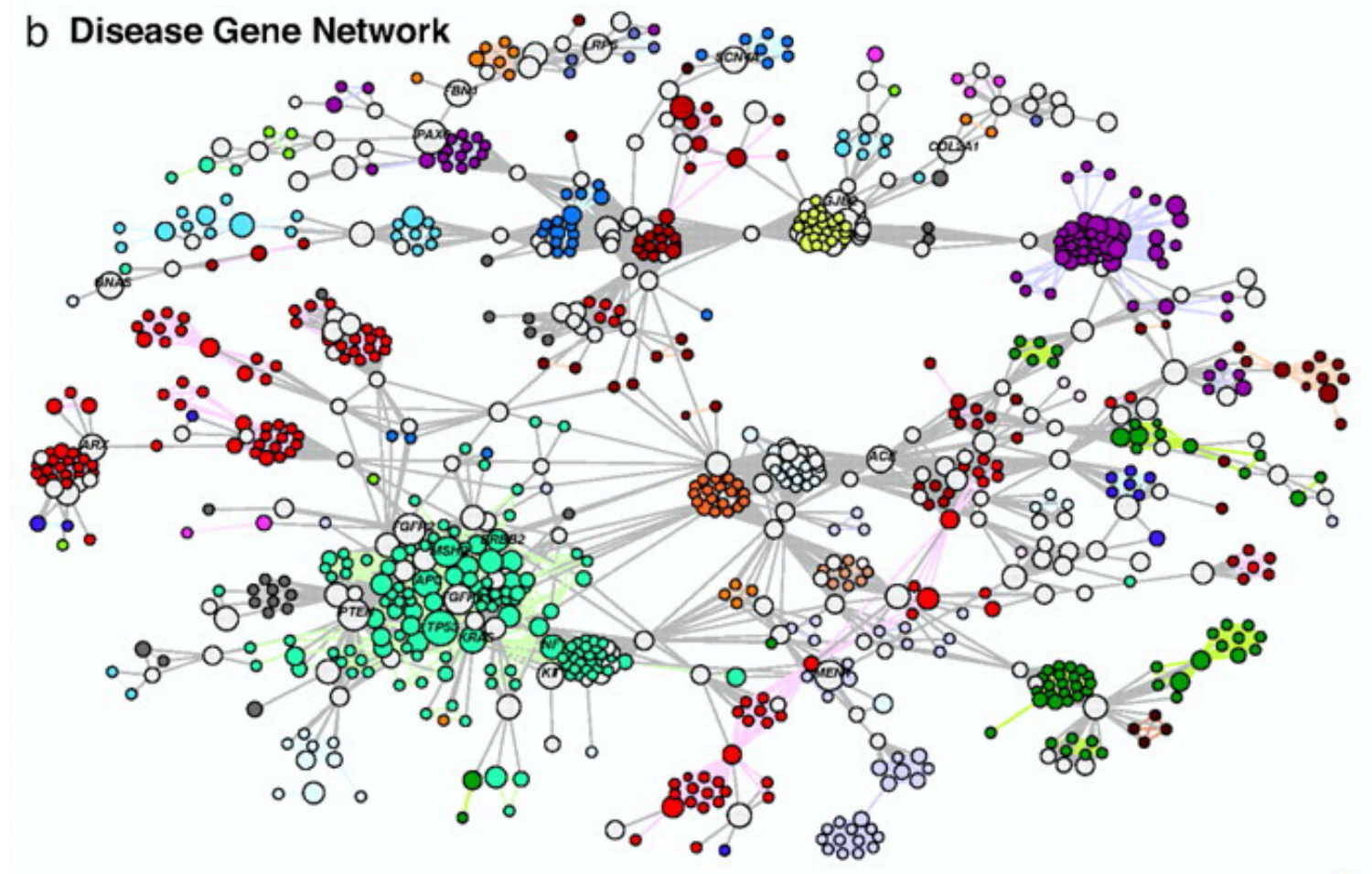
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## ★ Problems:

Construction via text mining:

- High effort
- Not precise
- Not constant



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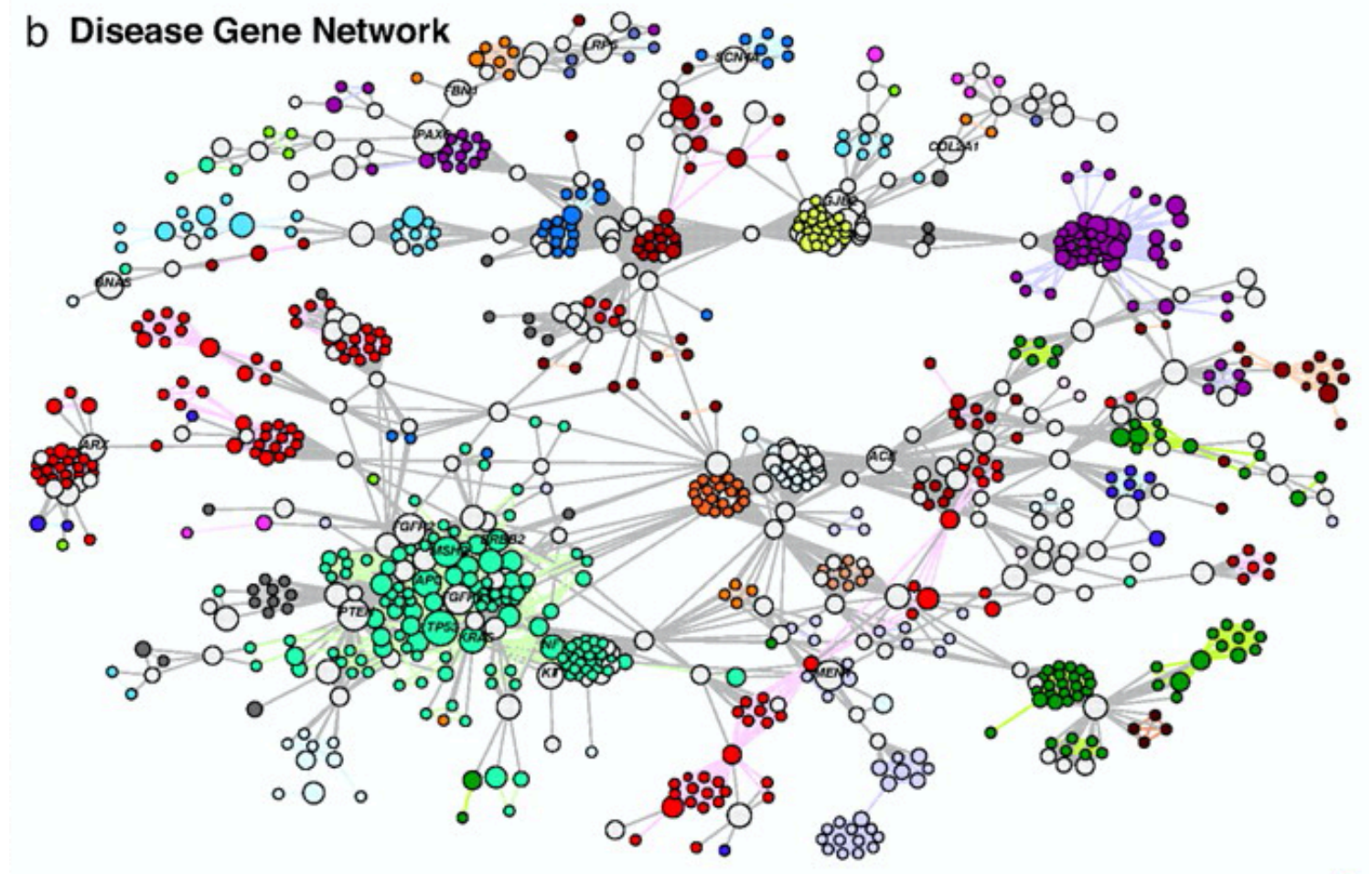
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Via harvesting known Gene-Disease relations networks can be constructed and clustered:

## ★ THIS PROJECT (base):

Extract such a disease-gene network directly from a set of GWAS



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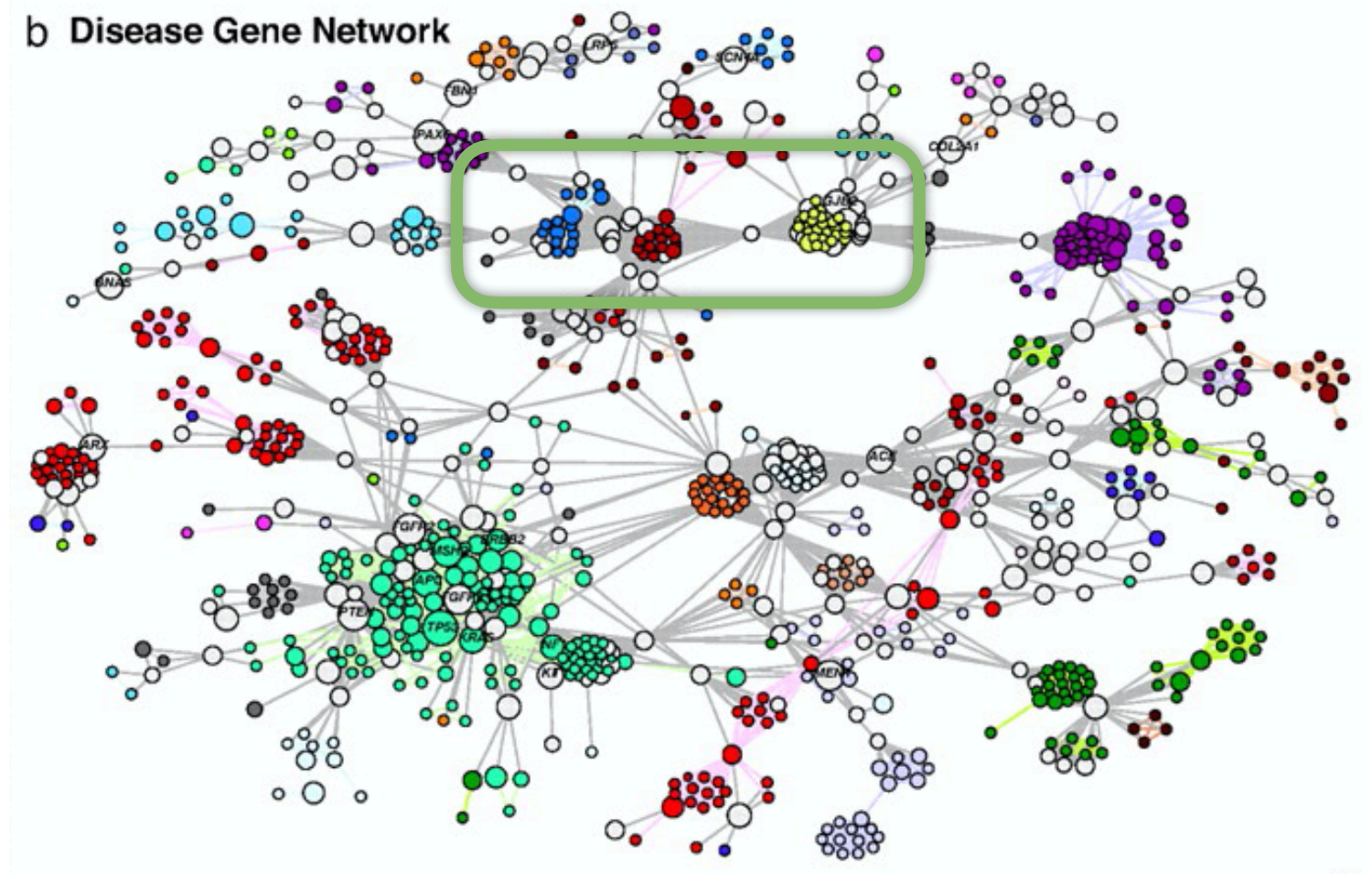
## ★ Human disease network

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Via harvesting known Gene-Disease relations networks can be constructed and clustered:

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# Outline

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BASE

# Technicalities

## ★ Data:

Publicly available GWAS summary statistics.

( GWAS catalog: <https://www.ebi.ac.uk/gwas/downloads/summary-statistics> )

## ★ Tools:

**Python** ecosystem:

PascalX, jupyter, numpy, scipy, scikit-learn, pandas, matplotlib, ...

( Prior knowledge of Python recommended )

...



# Outcome



## You will acquire:

- General knowledge about GWAS studies
- Experience working with large scale GWAS summary statistics
- Data pre-processing skills in python and linux shell
- Big data skills in python
- General knowledge about the spectrum of human diseases and their interplay

Feel free to contact me by email if you  
have any questions !

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