The Hallmarks of Depression

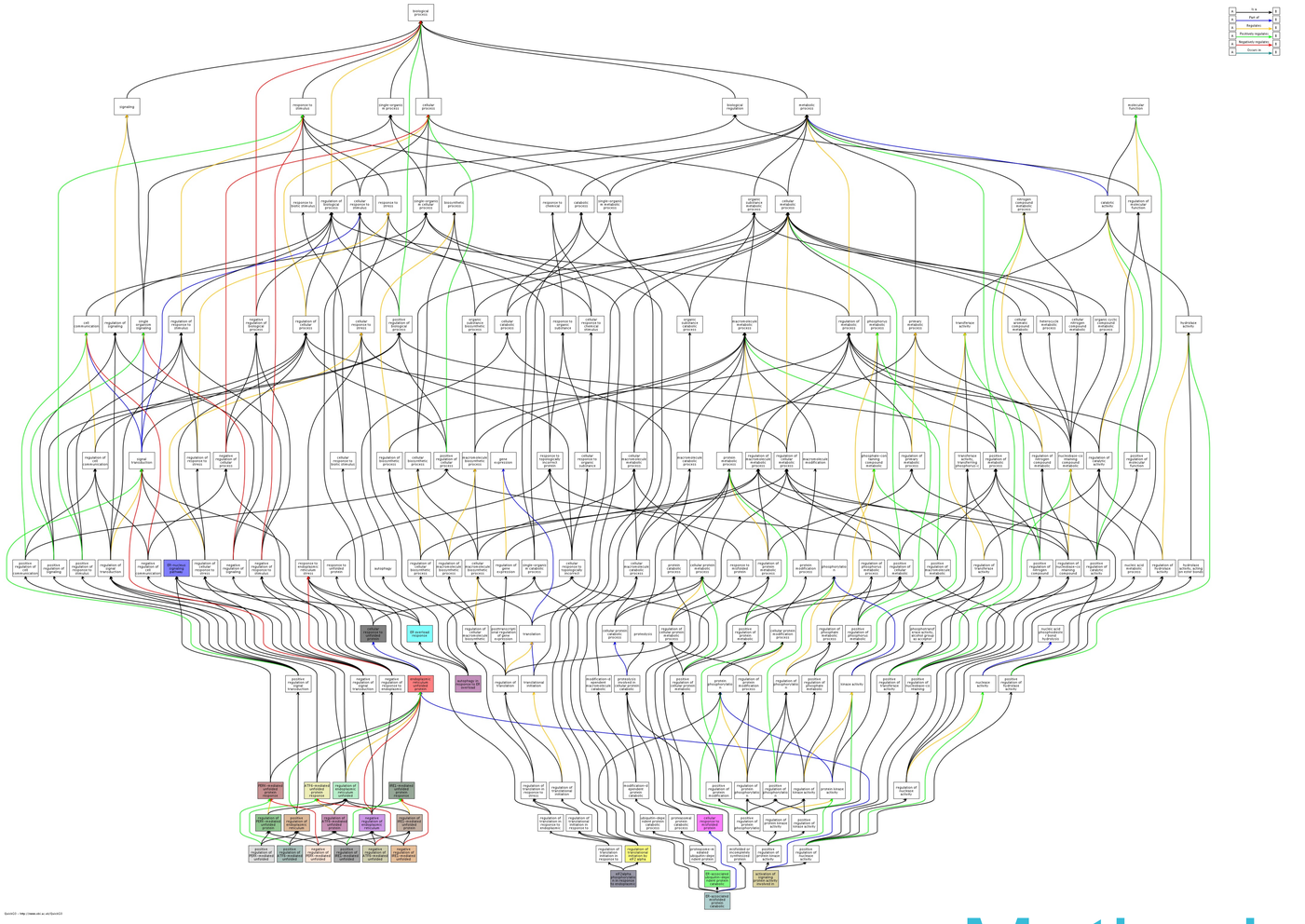
Identification and enrichment of aging-associated variants in major depressive disorder

- June 2013: “The Hallmarks of Aging”
  - Carlos López-Otín, Maria A. Blasco, Linda Partridge, Manuel Serrano, Guido Kroemer
- Similarities between aging and major depressive disorder (MDD)
- Enrichment of significant aging genes in MDD pathways?

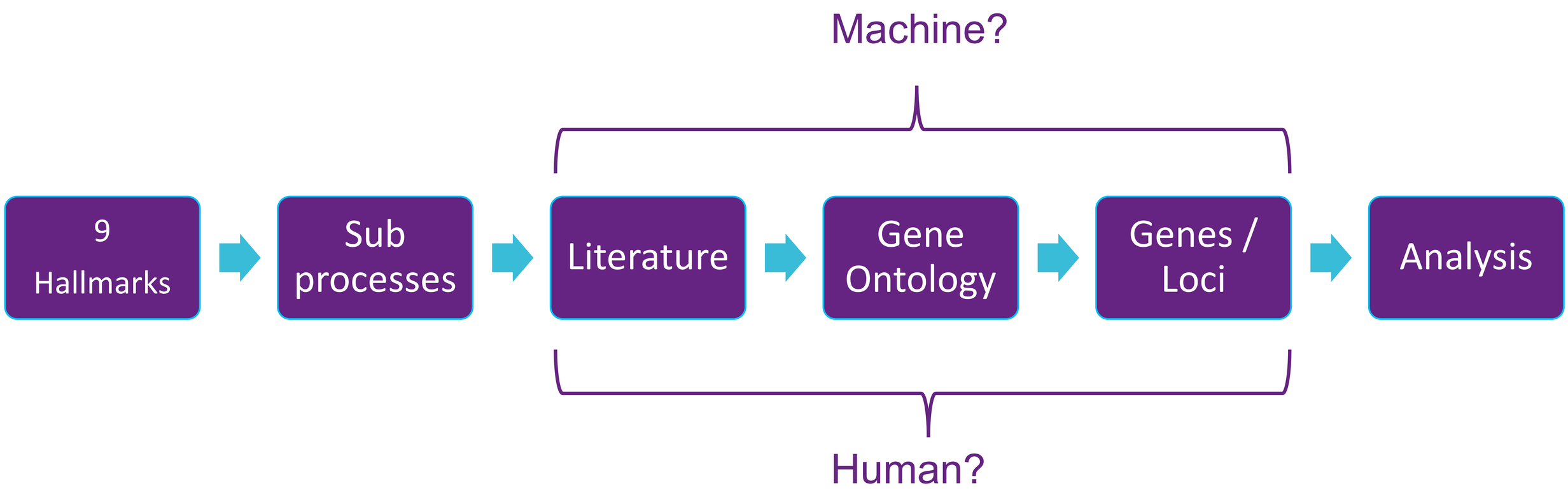
9 Hallmarks → Sub processes → Literature → Gene Ontology → Genes / Loci → Analysis

Methods

- Gene Ontology (GO)
- Create a structured vocabulary of gene products
  - Biological Processes
  - Cellular Components
  - Molecular Functions
- Search by terms to identify genes and *vice versa*
- Open access



Methods


Machine?
9 Hallmarks
Sub processes
Literature
Gene Ontology
Genes / Loci
Analysis
Human?

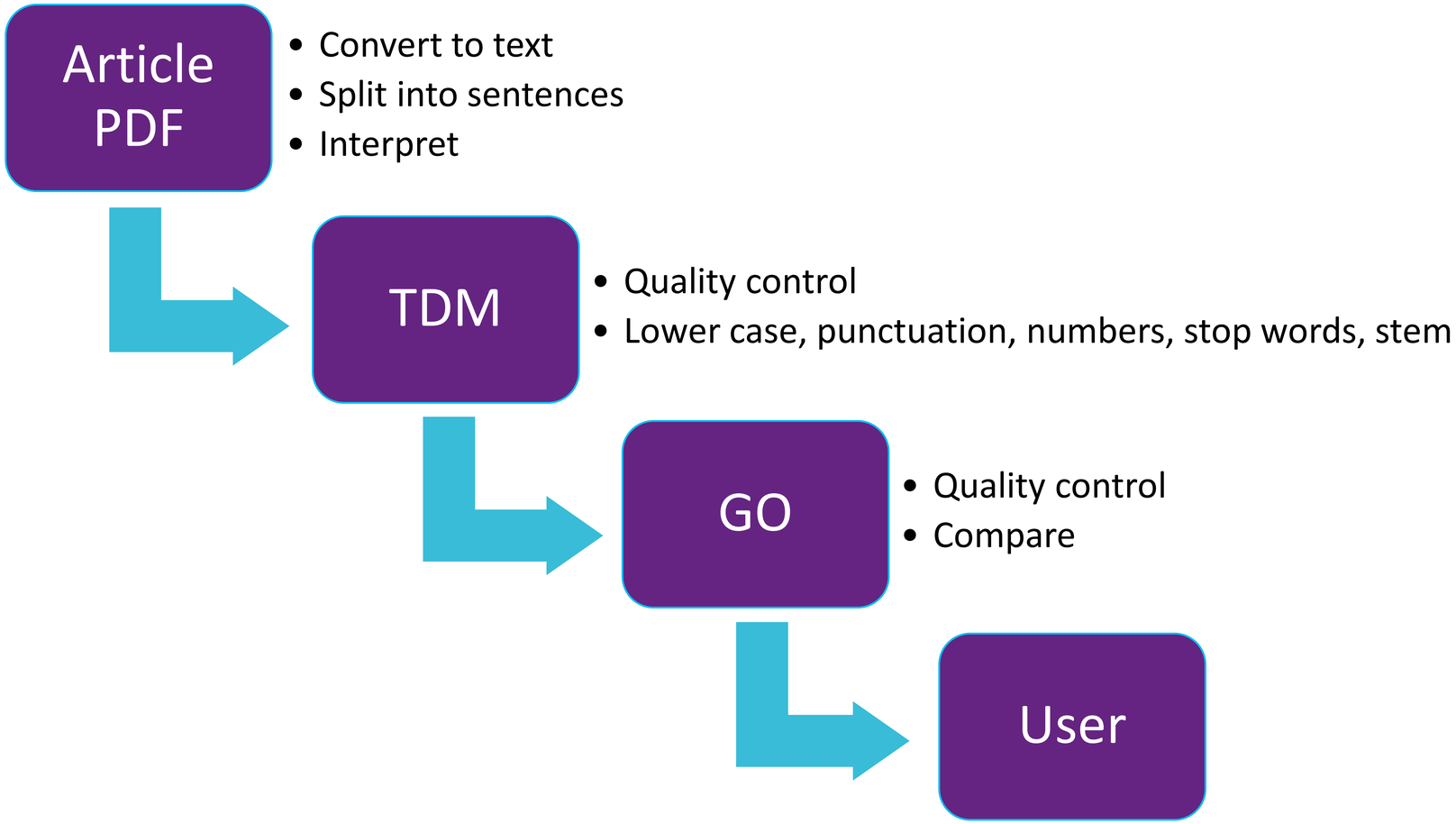
Methods

Methods

Goals:

- Mine GO terms from literature
- Prioritize and present GO terms
- Allow user to trim results according to biology
- Find all genes annotated to priority terms
- Possible cytoscape mapping
- Reproducible, traceable
  - Dated to GO at a certain time
  - Two users could come up with the same list of genes

Analysis


Article PDF
Convert to text
Split into sentences
Interpret
TDM
Quality control
Lower case, punctuation, numbers, stop words, stem
GO
Quality control
Compare
User

Analysis

COMMENTARY FOCUS ON UBIQUITIN

Ubiquitin sets the timer: impacts on aging and longevity

Éva Kevei & Thorsten Hoppe

The spatial organization of cellular processes in eukaryotes gave rise to the need for organelle-specific protein degradation path-ways. For example, misfolded proteins in the endoplasmic reticulum (ER) are retrotranslocated into the cytosol for ubiquitination and proteasomal targeting, through a process called ER-associated degradation (ERAD).

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Analysis

Article PDF

- Convert to text
- Split into sentences
- Interpret

The spatial organization of cellular processes in eukaryotes gave rise to the need for organelle-specific protein degradation path- ways.

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for example misfolded proteins in the endoplasmic reticulum er are retrotranslocated into the cytosol for ubiquitination and proteasomal targeting through a process called er associated degradation erad

spatial organ cellular process eukaryot gave rise need organell specif protein degrad path way

exampl misfold protein endoplasm reticulum er retrotransloc cytosol ubiquitin proteasom target process call er associ degrad erad

Analysis

TDM

- Quality control
- Lower case, punctuation
- numbers, stop words, stem

Word	1	2
path	1	0
reticulum	0	1
retrotransloc	0	1
spatial	1	0
ubiquitin	0	1

Article TDM
(partial)

Word	1
ubiquitin	1
depend	1
spatial	1
retrotransloc	1
factor	1

GO terms TDM

"Ubiquitin Dependent spatial retrotranslocation Factor"

Length = 5

Analysis

TDM

- Quality control
- Lower case, punctuation
- numbers, stop words, stem

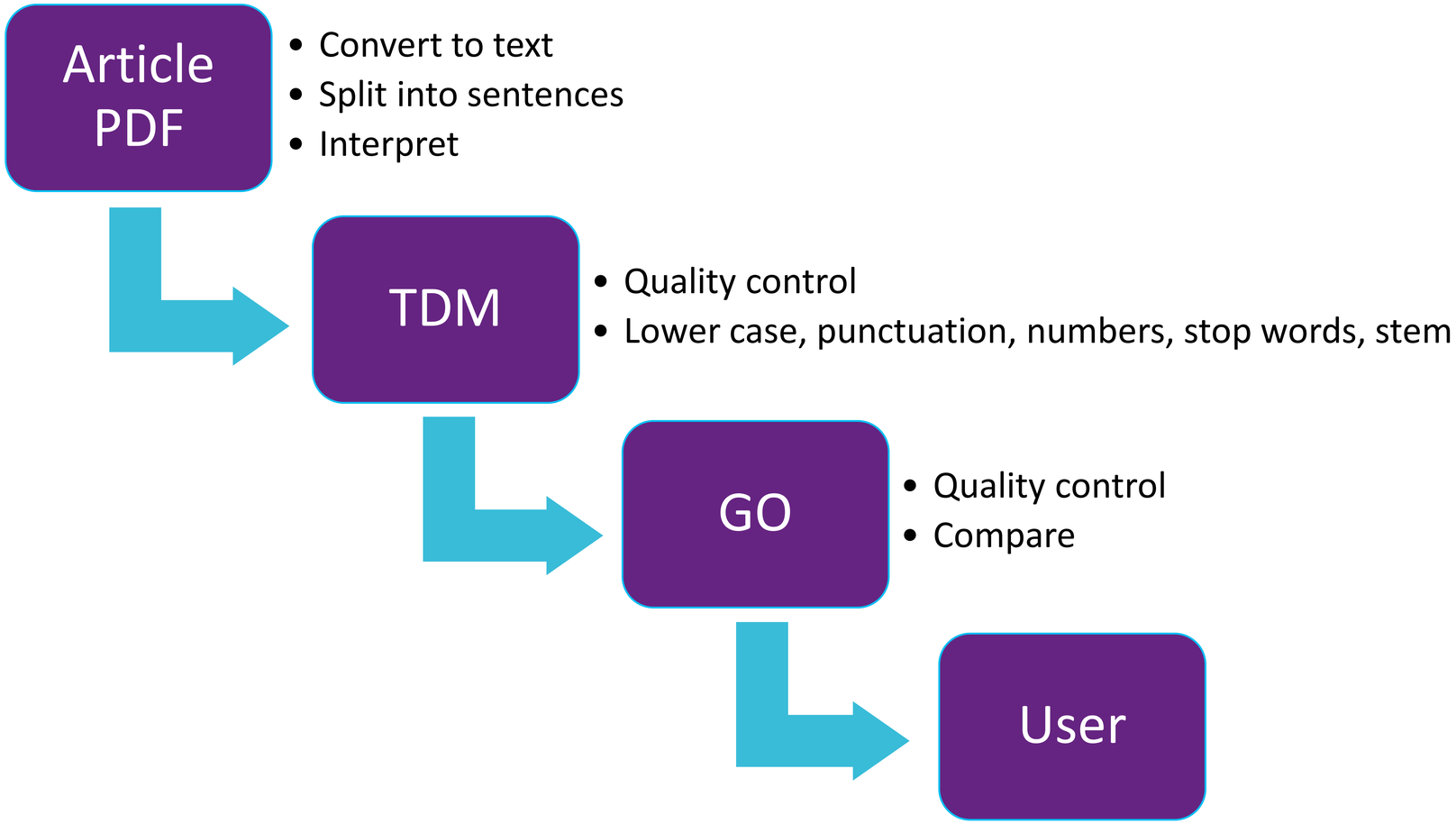
Word	1	2
ubiquitin	1	0
depend	1	0
spatial	1	0
retrotransloc	1	0
factor	0	0
SUM	4 (accept)	0 (reject)

Article / GO
TDM

"Ubiquitin Dependent spatial retrotranslocation Factor"

Length = 5

Analysis


Article PDF
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Analysis

- In pilot, 12 of 18 terms correctly identified
- Have to run with full panel
- Must improve prioritization

Results & Next Steps

- Next steps
  - Improved syntax analysis (not just counting)
  - Training on real data
  - Multiple methods

Results &
Next Steps