



A logical functional analysis pipeline

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... introduction

... it is becoming increasingly clear, that the ability to reason at the highest possible level with the available data has a profound effect on the kind of questions scientists can address. It is indeed the view of experimental data as knowledge which is becoming an important realisation among the scientists in the biological sciences.

Traditionally, data analysis has been viewed as an independent exercise it is increasingly becoming apparent though, that data analysis is now taking a more central role with important high-impact papers focusing on evaluating results rather than producing unique datasets.

why Prolog?



- **Clear computational paradigm**
- **Knowledge representation and reasoning**
- **Robustness**
- **Memory management**
- **Program and data duality**
- **High level of abstraction**
- **Calling R functions**
- **Indexing**
- **Database interactions**
- **Operating systems support**

what is lacking ?



- **Lack of programmers**
- **Language development and stability**
- **Critical mass**
- **Performance**

Real - Integrative statistics with R

Run R functions on Prolog data.

Reductionist design

? - $x \leftarrow \text{mean}([1, 2, 3]).$

? - $X \leftarrow x.$

$X = 2.0$

? - $y \leftarrow [1, 2, 3], x \leftarrow \text{mean}(y).$

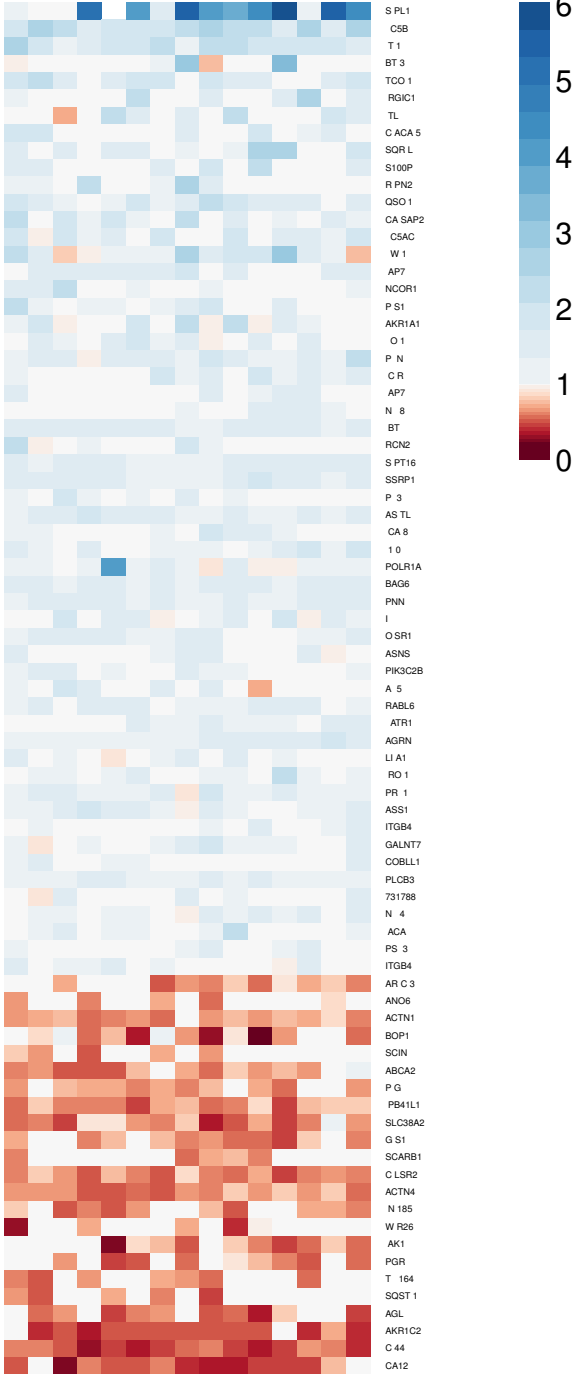
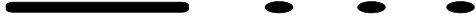
Tyrosine Kinase knockouts



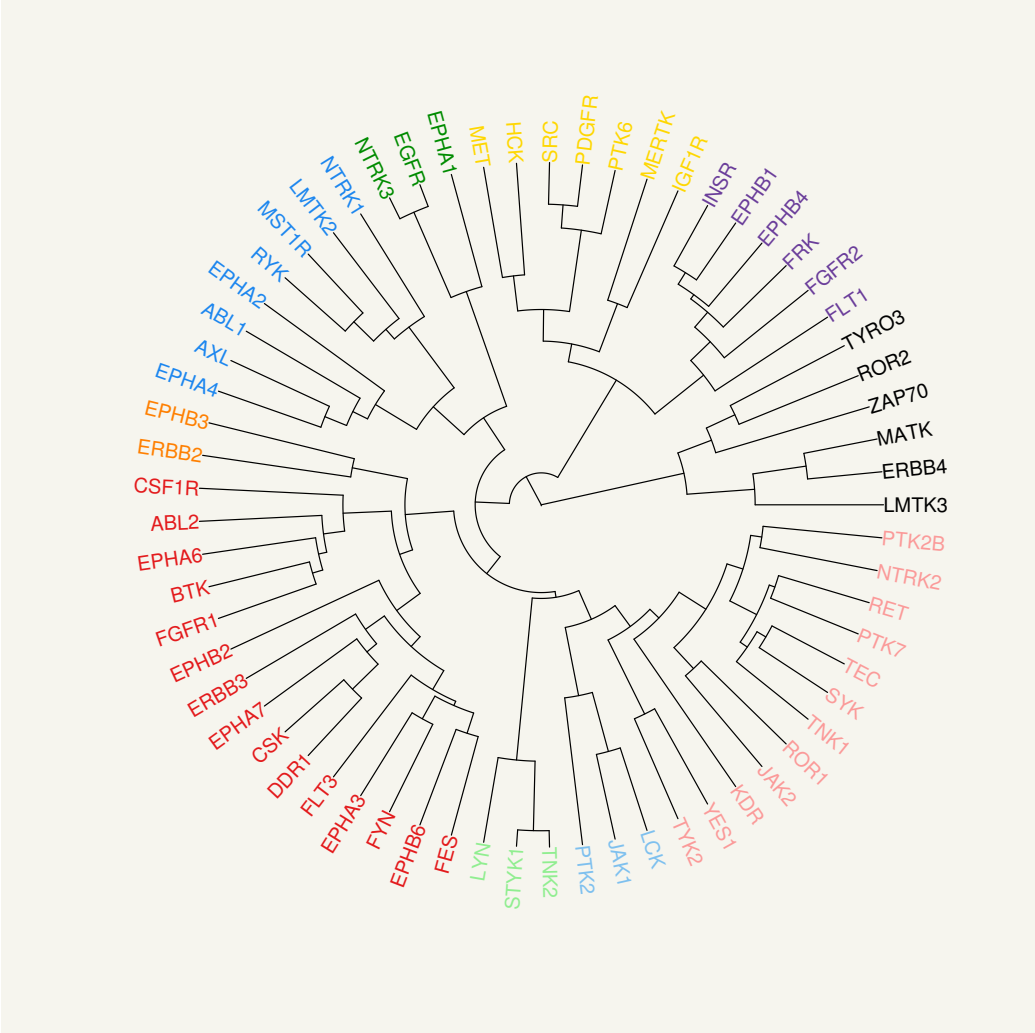
Important molecules in signalling.

65 knock outs

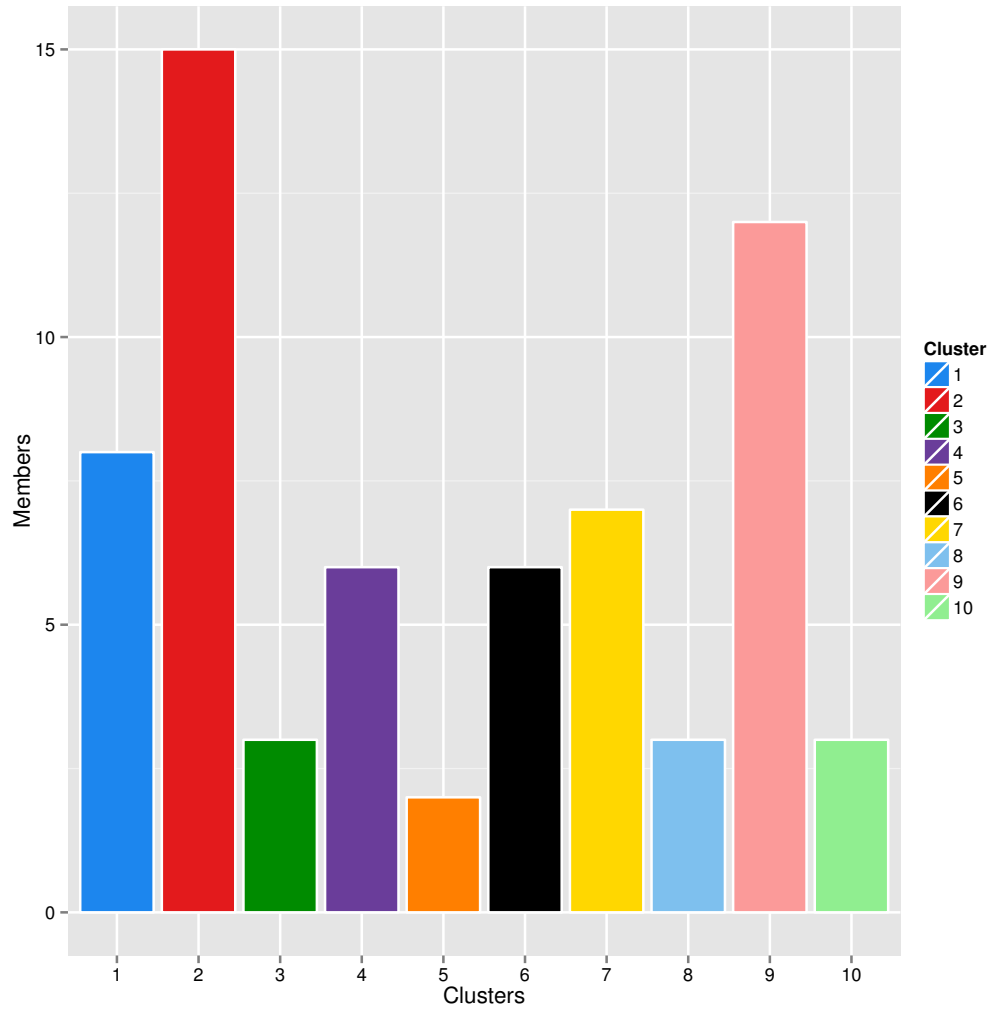
dysregulation patterns



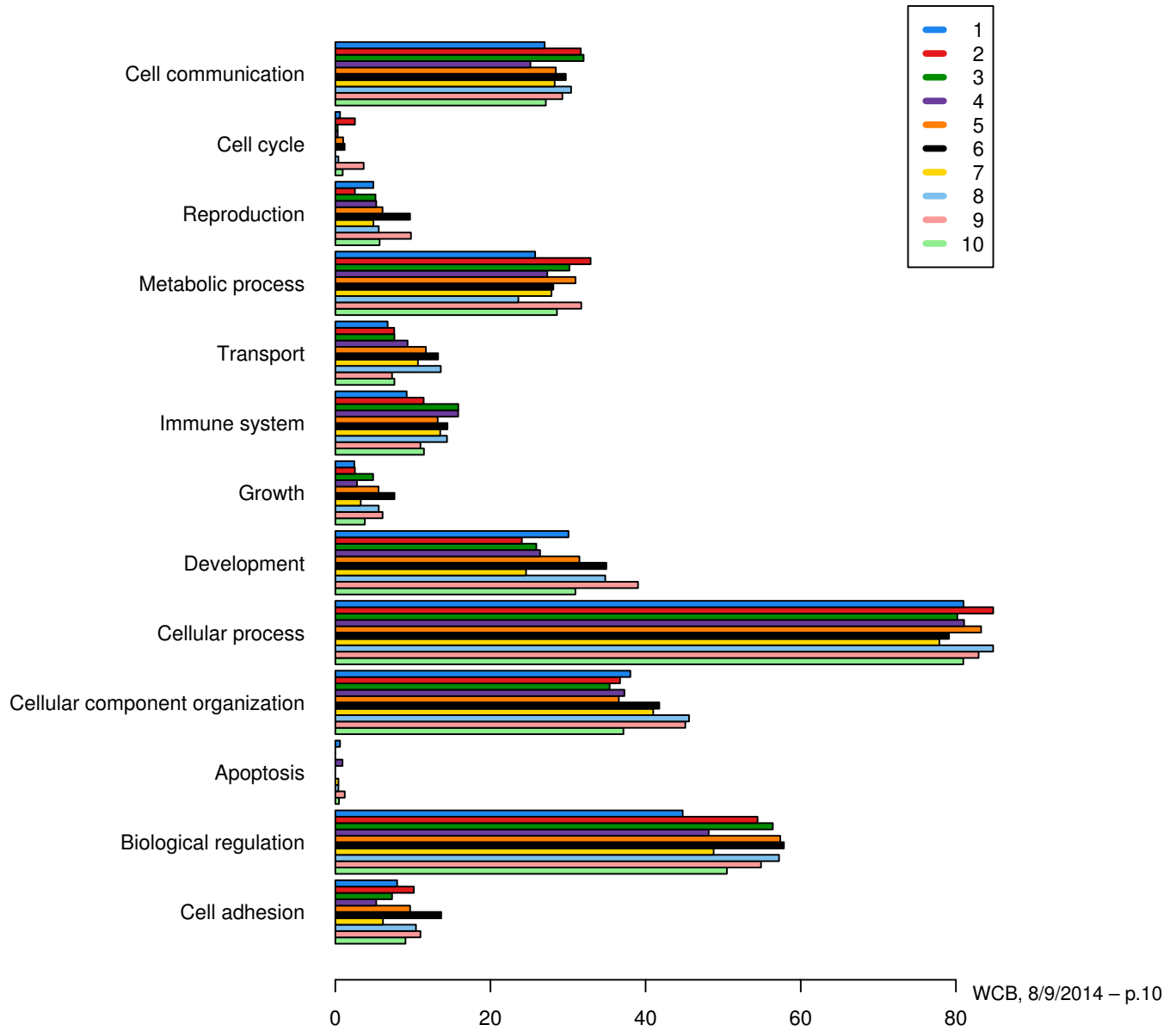
clusters based on dysregulation



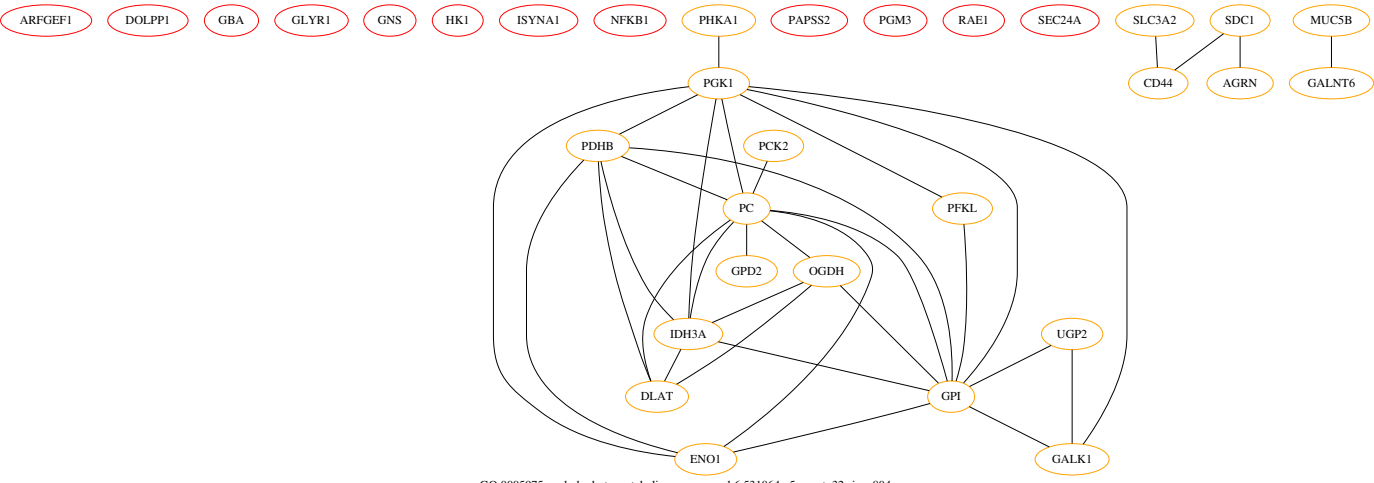
cluster populations



level 2 GO biological process

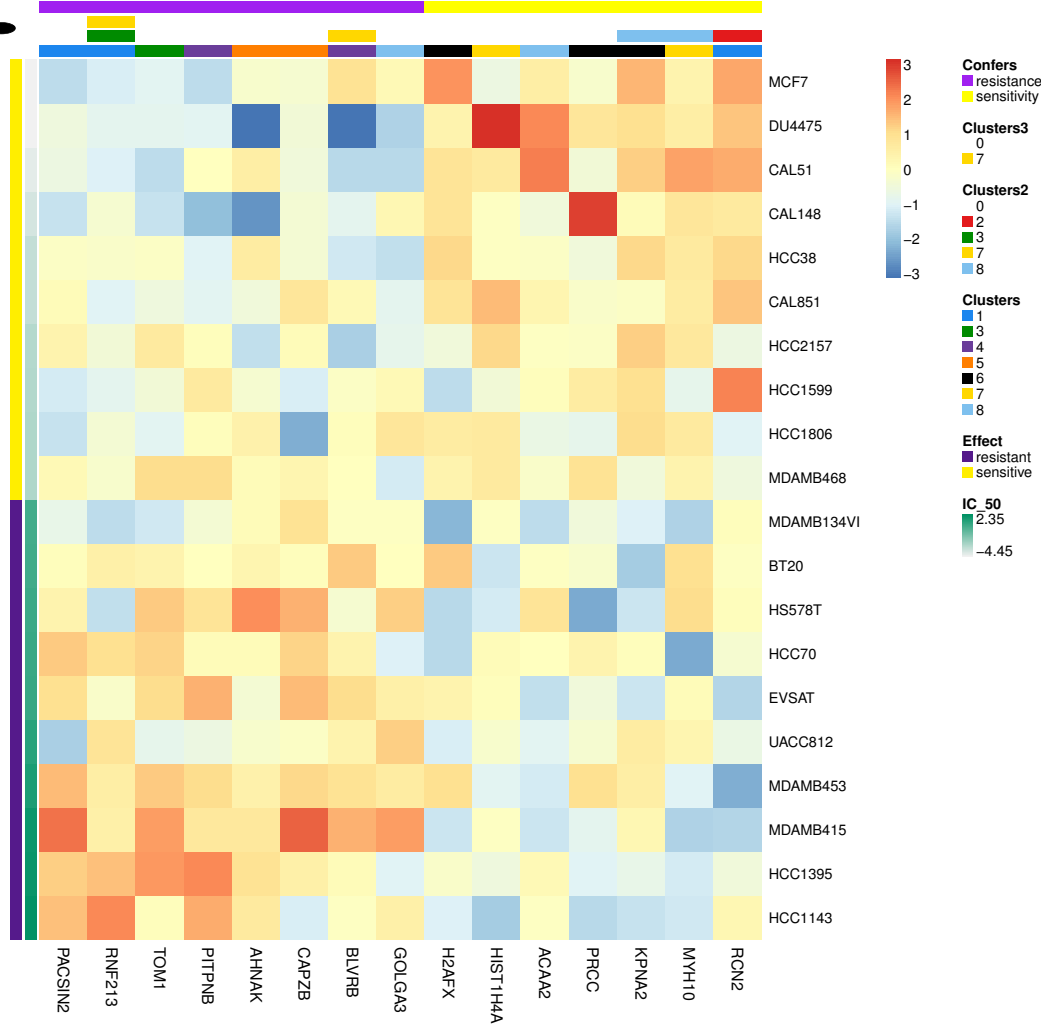


4-carbohydrate metabolic process

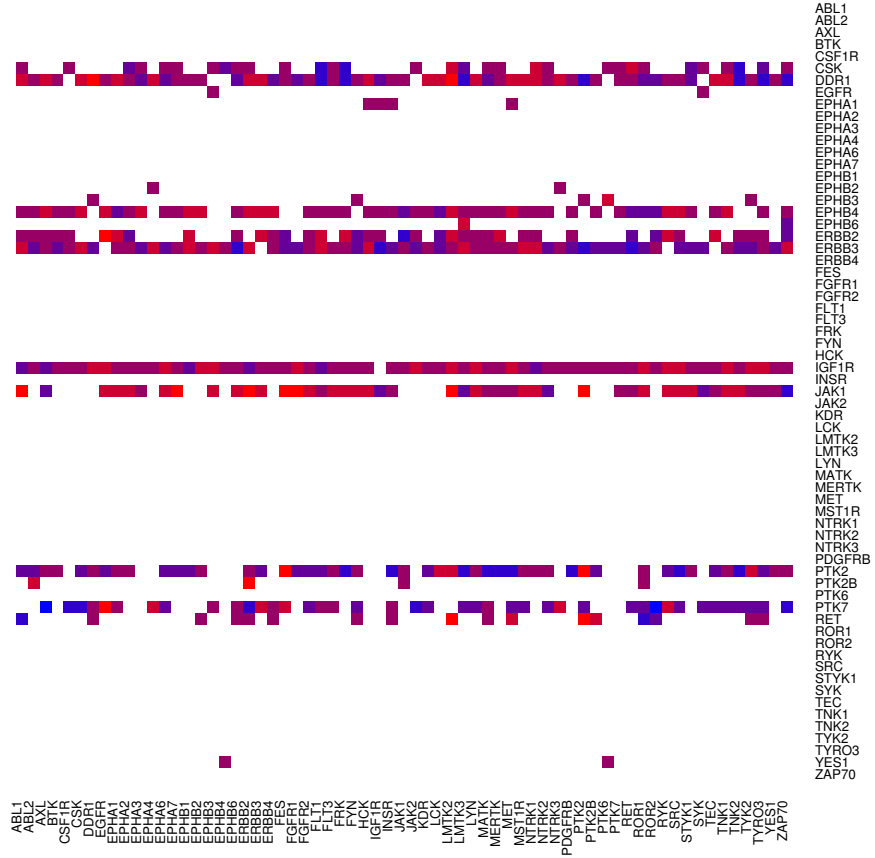
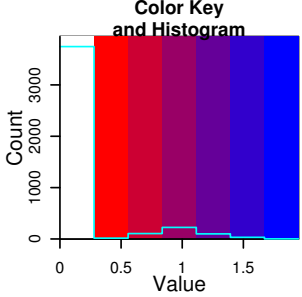


GO:0005975, carbohydrate metabolic process. pval:6.531864e-5 count: 32 size: 804.

doxorubicin



knockout effects on TKs



software



Packs (add-ons) for SWI-Prolog

- db_facts* 44/19 db-tables-as-facts & SQL layer
- proSQLite* 109/33 SQLite interface
- pubmed* 14/3 Access pubmed publication records
- Real* 68/11 Integrative statistics with R
- mtx* working with matrices
- go_string* GO term STRING graphs
- map_id* mapping across nomenclatures
- func* functional analysis pipeline