



FIMED

**A Service for Flexible Management and
Analysis of Heterogeneous Clinical Data**

[Sandro Hurtado](#), [José García-Nieto](#) & [Ismael Navas-Delgado](#)

Background

CTMS *Clinical Trial Management System*



Clinical data capture



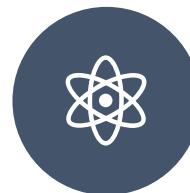
Data management



Analysis techniques



Molecular
information



Drugs, therapies,
diagnostic support,
Patient Management

Background

CTMS *Clinical Trial Management System*

Clinical data features:

- Dynamic and heterogeneous
- Variability of clinical data
- From multiple sources
- Different structures and data formats

CTMS design limitations:

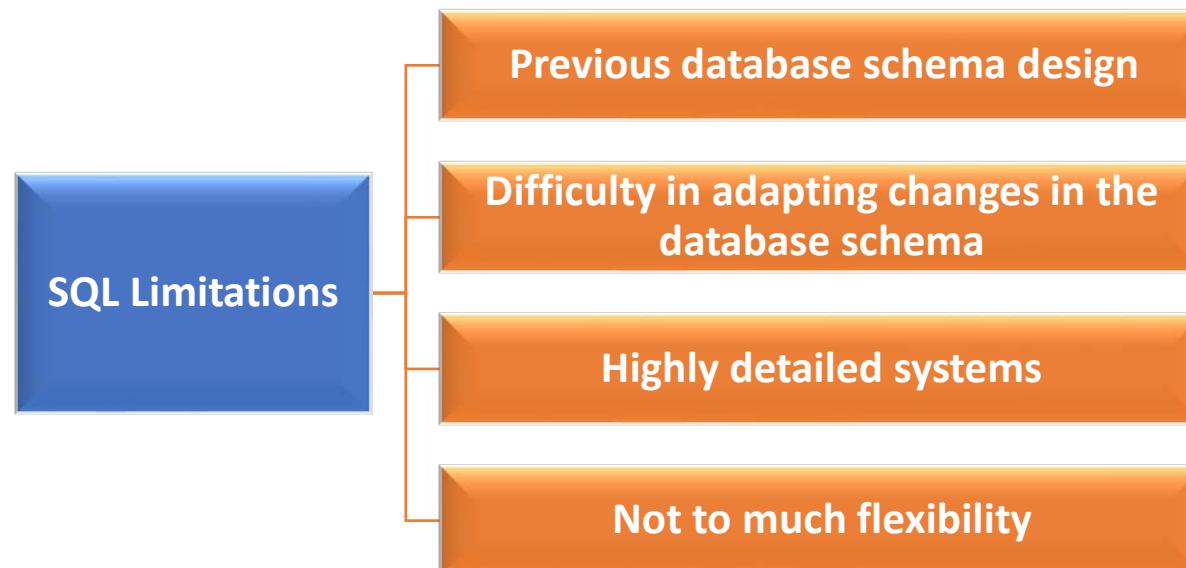
- Lack of adaptability
- They are not easily customizable
- Difficult management

Background

CTMS *Clinical Trial Management System*

Software applications have traditionally relied on the use of relational database management systems, such as MySQL, Oracle, or Microsoft SQL Server.

**It introduces certain limitations when dealing with clinical data*



Background

CTMS *Clinical Trial Management System*

These web-based tools are one of the few ones that allow building CRFs in any spreadsheet program and uploading them via the user interface.



5

REDCap
Research Electronic Data Capture

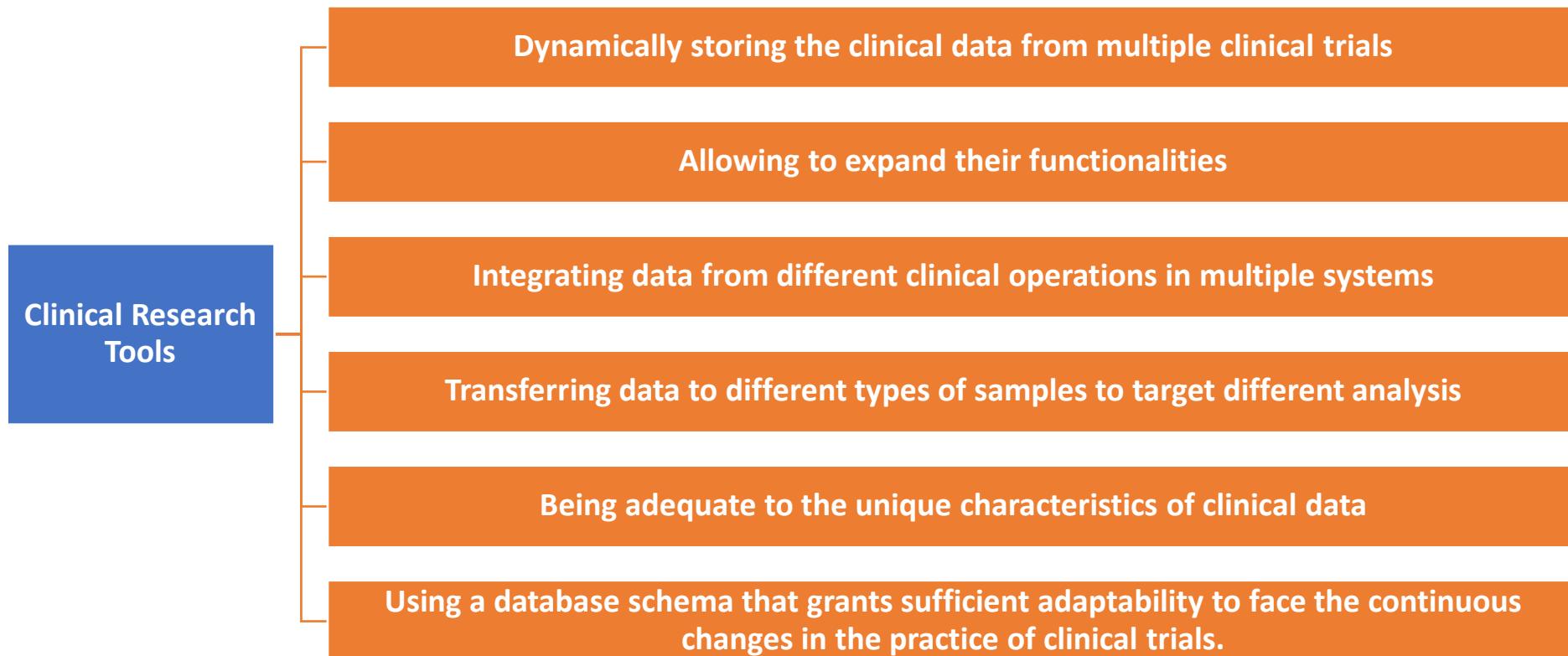
 **Phoenix**
Clinical Research

 **OpenClinica**
Open Source for Clinical Research

Background

CTMS *Clinical Trial Management System*

Features that would be of interest in clinical research tools:



CRF Design



Data Collection



FI MED A large orange graphic containing the text "FI MED" followed by a stylized orange leaf icon.

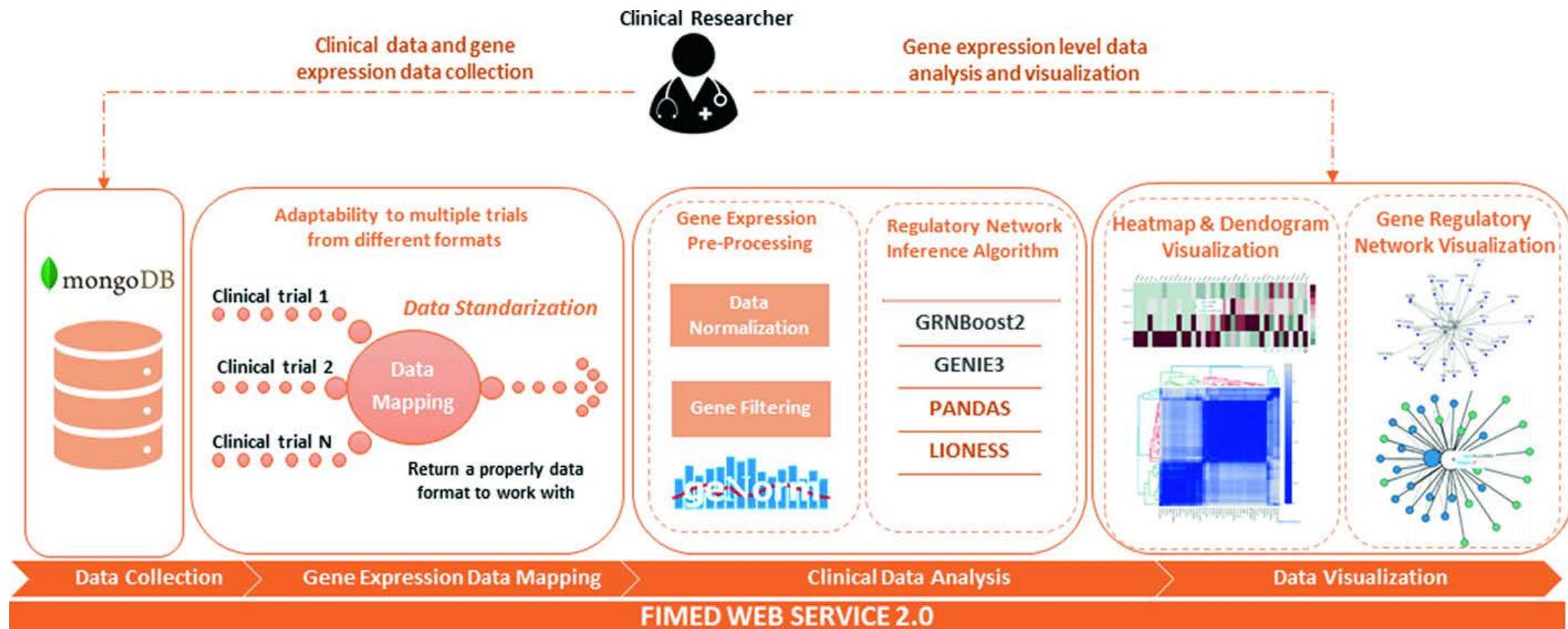
Analysis Tools



Search Engine



FIMED GENERAL WORKFLOW



Data collection

We have designed an initial MongoDB database schema, which is dynamically adapting user needs along with the database scheme.



* To ensure data protection, patient information has been encrypted in MongoDB

Code Snippet 1: JSON Database Schema

```
{
  "_id": <ObjectId(),>
  "Name": <String>,
  "Surname": <String>,
  "Password": <String>,
  "EncryptKey": <Secret key String>,
  "Patients": [
    {
      "_id": <ObjectId(),>
      "_patientInformation": <Object>,
      "_files": [
        {
          "filename": <String>,
          "metadata": <Object>,
          "gridFS": <Object>
        }
      ],
      "_clinicalSamples": [
        {
          "sample_name": <String>,
          "metadata": <Object>,
          "gridFS": <Object>
        }
      ],
      "Form": <Object>,
      "Analysis_results": [
        {
          "name_analysis": <String>,
          "results": <String>
        }
      ]
    }
  ]
}
```

Gene expression File

```

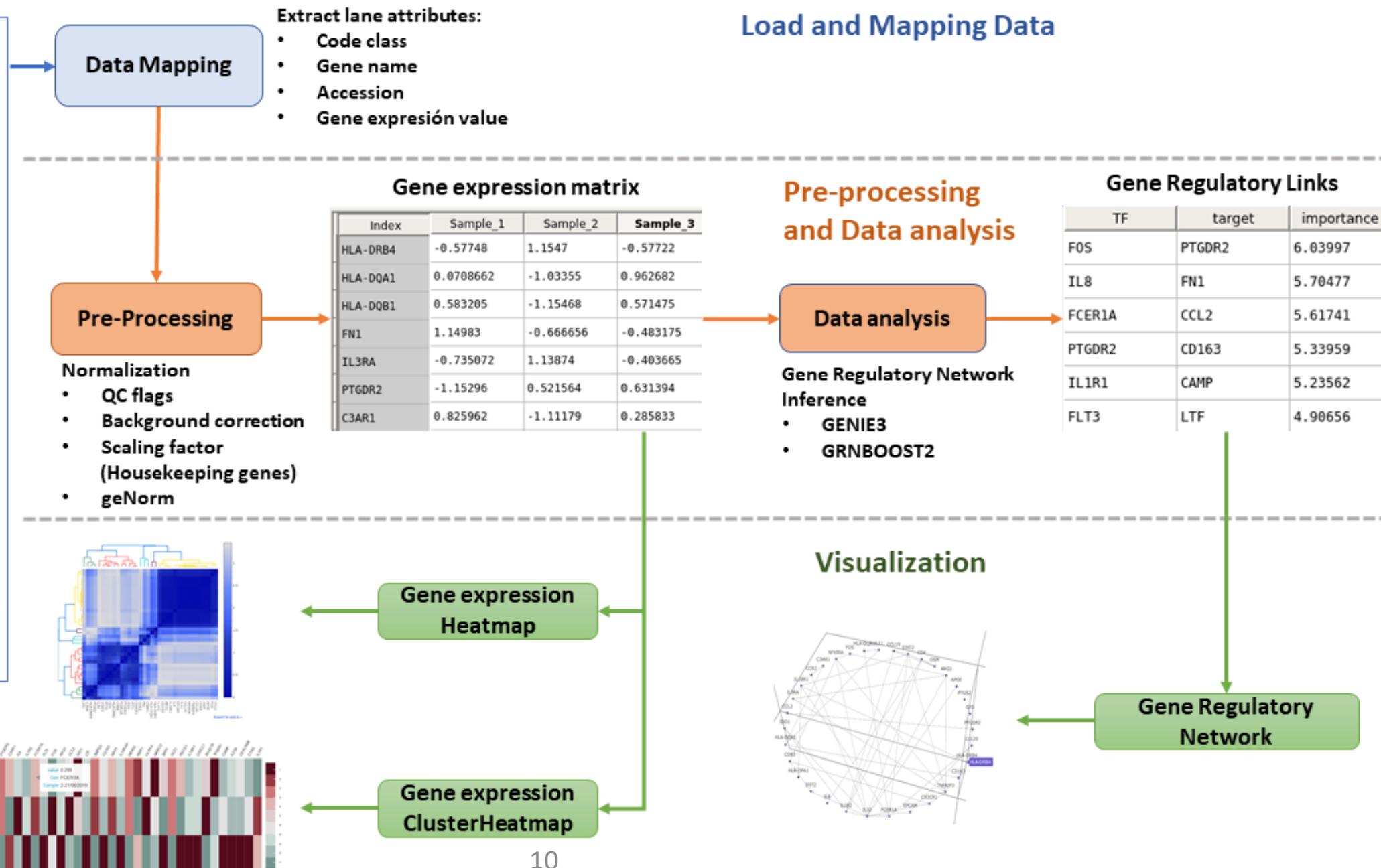
<Header>
FileVersion,1.7
SoftwareVersion,4.0.0.3
</Header>

<Sample_Attributes>
ID,06
Owner,
Comments,
Date,20161004
GeneRLF_NS_CancerImmune_C2929
SystemAPF,n6_VDV1
</Sample_Attributes>

<Lane_Attributes>
ID,4
FovCount,555
FovCounted,543
ScannerID,1312C0135
StagePosition,1
BindingDensity,0.73
CartridgeID,CARTUCHO1-reescaneado
CartridgeBarcode,
</Lane_Attributes>

<Code_Summary>
CodeClass,Name,Accession,Count
Endogenous,C4BPA,NM_000715.3,7
Endogenous,C7,NM_000587.2,4
Endogenous,CASP10,NM_032977.3,85
Endogenous,PBK,NM_018492.2,2
Endogenous,CCL25,NM_005624.2,2
Endogenous,CD1D,NM_001766.3,375
Endogenous,TFRC,NM_003234.1,165
Endogenous,FPR2,NM_001462.3,5552
Endogenous,CD24,NM_013230.2,188
Endogenous,TNFRSF14,NM_003820.2,746
Endogenous,DDX43,NM_018665.2,19
Endogenous,IL13RA2,NM_000640.2,2
Endogenous,IL1R,NM_002185.2,2971
Endogenous,IL1A,NM_000575.3,3

```



Gene expression File

```

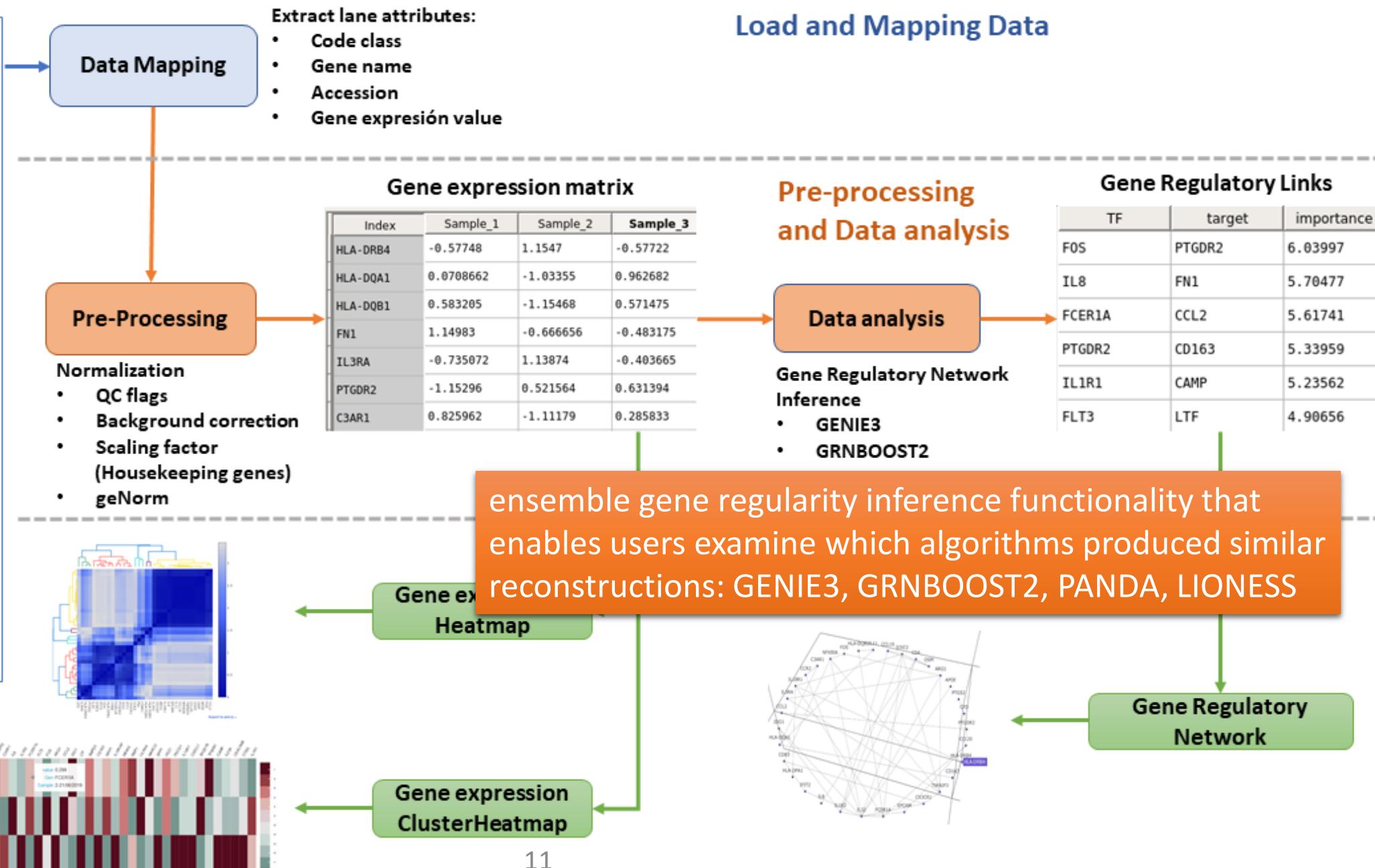
<Header>
FileVersion,1.7
SoftwareVersion,4.0.0.3
</Header>

<Sample_Attributes>
ID,06
Owner,
Comments,
Date,20161004
GeneRLF,NS_CancerImmune_C2929
SystemAPF,n6_VDV1
</Sample_Attributes>

<Lane_Attributes>
ID,4
FovCount,555
FovCounted,543
ScannerID,1312C0135
StagePosition,1
BindingDensity,0.73
CartridgeID,CARTUCHO1-reescaneado
CartridgeBarcode,
</Lane_Attributes>

<Code_Summary>
CodeClass,Name,Accession,Count
Endogenous,C4BPA,NM_000715.3,7
Endogenous,C7,NM_000587.2,4
Endogenous,CASP10,NM_032977.3,85
Endogenous,PBK,NM_018492.2,2
Endogenous,CCL25,NM_005624.2,2
Endogenous,CD1D,NM_001766.3,375
Endogenous,TFRC,NM_003234.1,165
Endogenous,FPR2,NM_001462.3,5552
Endogenous,CD24,NM_013230.2,188
Endogenous,TNFRSF14,NM_003820.2,746
Endogenous,DDX43,NM_018665.2,19
Endogenous,IL13RA2,NM_000640.2,2
Endogenous,IL7R,NM_002185.2,2971
Endogenous,IL1A,NM_000575.3,3

```



Gene expression analysis

Gene regulatory network

*This section currently accepts gene expression samples in Nanostring format (RCC files)

Patient:62349e21c7ec29c739d553ca [+ Add Samples](#)

| | |
|--------------|------|
| Patient_Code | 1054 |
| Gender | Male |

Patient:62370c92c7ec29c739d553f2 [+ Add Samples](#)

| | |
|--------------|--------|
| Patient_Code | 1104 |
| Gender | Female |

ANALYSIS SAMPLES

Selected samples

| Sample ID | Patient Code | Delete |
|----------------------------|--------------------------|------------------------|
| 1 623704f9c7ec29c739d553e7 | 62349e21c7ec29c739d553da | |
| 2 62370512c7ec29c739d553ea | 62349e21c7ec29c739d553da | |
| 3 62370529c7ec29c739d553ed | 62349e21c7ec29c739d553da | |
| 4 62370545c7ec29c739d553f0 | 62349e21c7ec29c739d553da | |

Remove those you are not interested.

SERVICES

Select one of these GRN Algorithms (By Default

GRNBOOST2:

[Advanced Configuration](#)

GRNBOOST2

GENIE3

GRNBOOST2

PANDA

LIONESS

ENSEMBLER

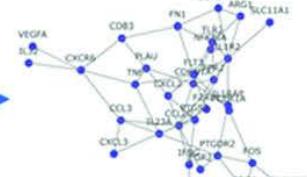
Please select one service to be executed.

% of significant levels

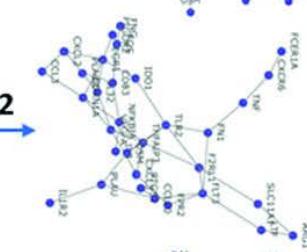
maximum Network

[Submit](#)

GENIE3



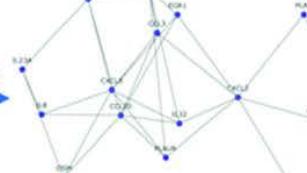
GRNBoost2



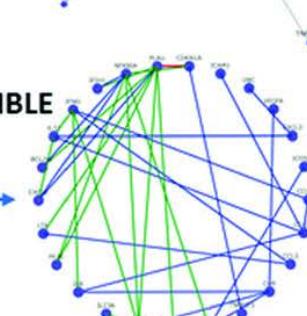
PANDA



LIONESS



GRN ENSEMBLE



Gene expression Visualization

FIMED Home Insert Search Analysis About us Help Logout

Dendrogram + Heatmap Analysis

List of Patients

Patient: 5dcd5365f534772c8292a6bb

| | |
|--------------|------|
| Patient_Code | 1164 |
| Gender | Male |

Patient: 5dd26f3f534772c8292a6ce

| | |
|--------------|--------|
| Patient_Code | 1059 |
| Gender | Female |

Analysis samples

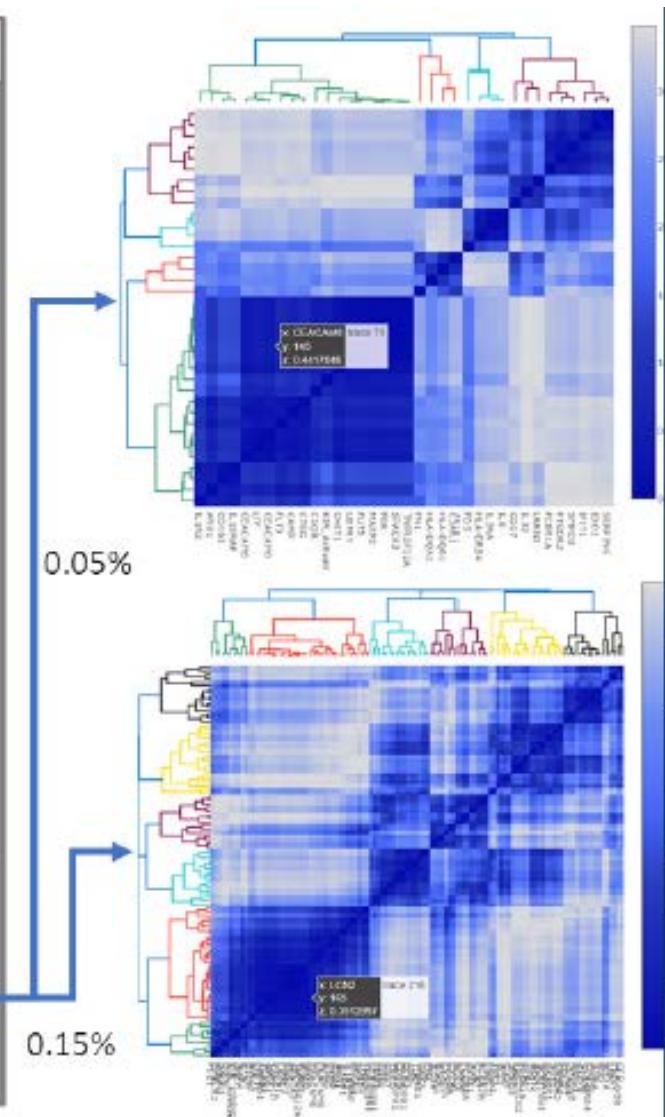
| Selected samples | Sample ID | Patient Code | |
|------------------|--------------------------|--------------------------|--|
| 1 | 5dcd5365f534772c8292a6bd | 5dcd5365f534772c8292a6bb | |
| 2 | 5dcd5381f534772c8292a6c0 | 5dcd5365f534772c8292a6bb | |
| 3 | 5dcd5396f534772c8292a6c3 | 5dcd5365f534772c8292a6bb | |
| 4 | 5dd26f3f534772c8292a6d0 | 5dd26f3f534772c8292a6ce | |

Remove those you are not interested

Dendrogram HeatMap

Select at least one service to be executed.

% of significantly altered gene expression levels



Patient:5dd5f534772c8292a6bb [+ Add Samples](#)

| | |
|--------------|------|
| Patient_Code | 1164 |
| Gender | Male |

Patient:5ddd26f3f534772c8292a6ce [+ Add Samples](#)

| | |
|--------------|--------|
| Patient_Code | 1059 |
| Gender | Female |

Analysis samples

| Selected samples | Sample ID | Patient Code | X delete |
|------------------|--------------------------|--------------------------|----------|
| 1 | 5dd5f534772c8292a6bd | 5dd5f534772c8292a6bb | |
| 2 | 5dd5f534772c8292a6c0 | 5dd5f534772c8292a6bb | |
| 3 | 5dd5f534772c8292a6c3 | 5dd5f534772c8292a6bb | |
| 4 | 5ddd26f3f534772c8292a6d0 | 5ddd26f3f534772c8292a6ce | |

Remove those you are not interested.

Services

 Gene regulatory network

Advanced Configuration

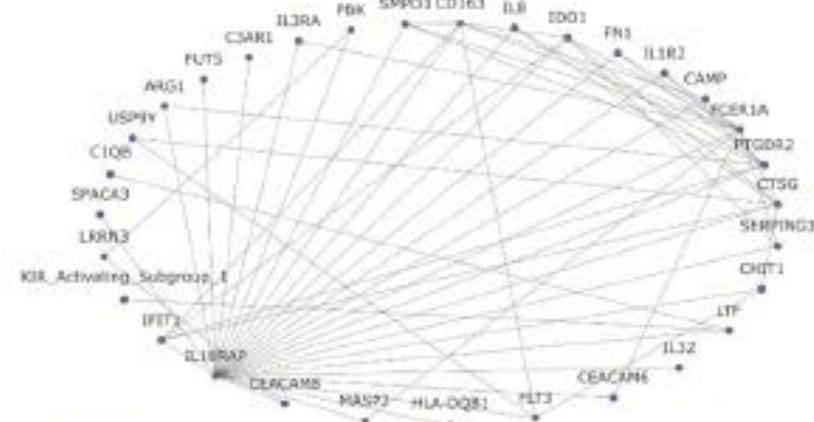
Select at least one service to be executed.

% of significantly altered gene expression levels

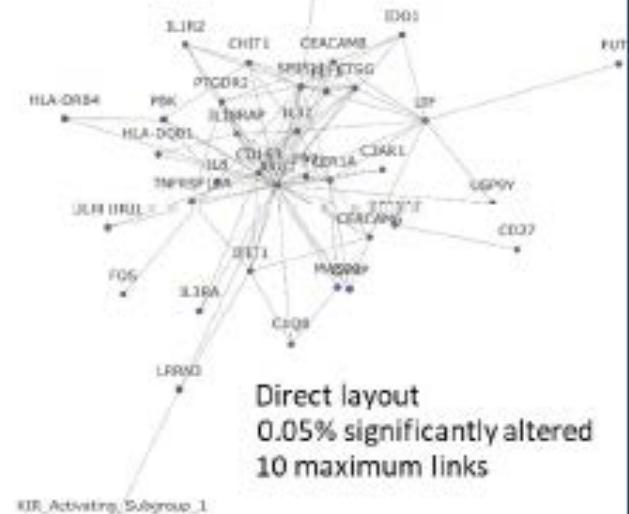
0.05%

maximum of links of the Gene Regulatory Network

10

[Submit](#)

Circular layout
0.1% significantly altered
6 maximum links



Direct layout
0.05% significantly altered
10 maximum links

Patient:5dd5365f534772c829

Patient_Code 1164

Gender Male

Patient:5ddd26f3f534772c829

Patient_Code 1059

Gender Femal

Analysis samples

Selected samples

Sample ID

- 1 5dd5365f534772c8292
- 2 5dd5381f534772c8292
- 3 5dd53986f534772c8292
- 4 5ddd26f3f534772c8292

Remove those you are not in

Services

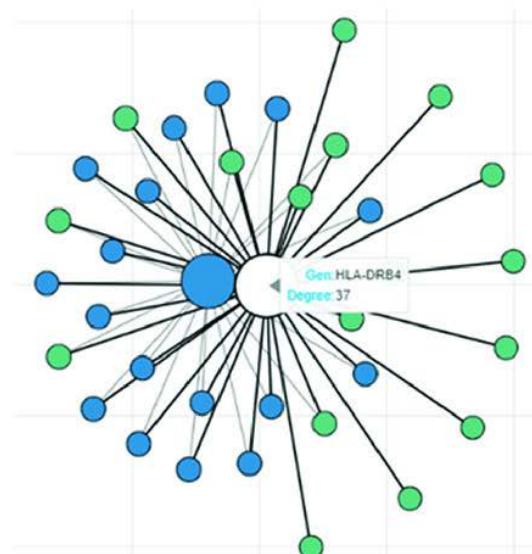
Gene regulatory network

Select at least one service to

% of significantly altered gene expression levels

maximum of links of the Gene Regulatory Network

Submit



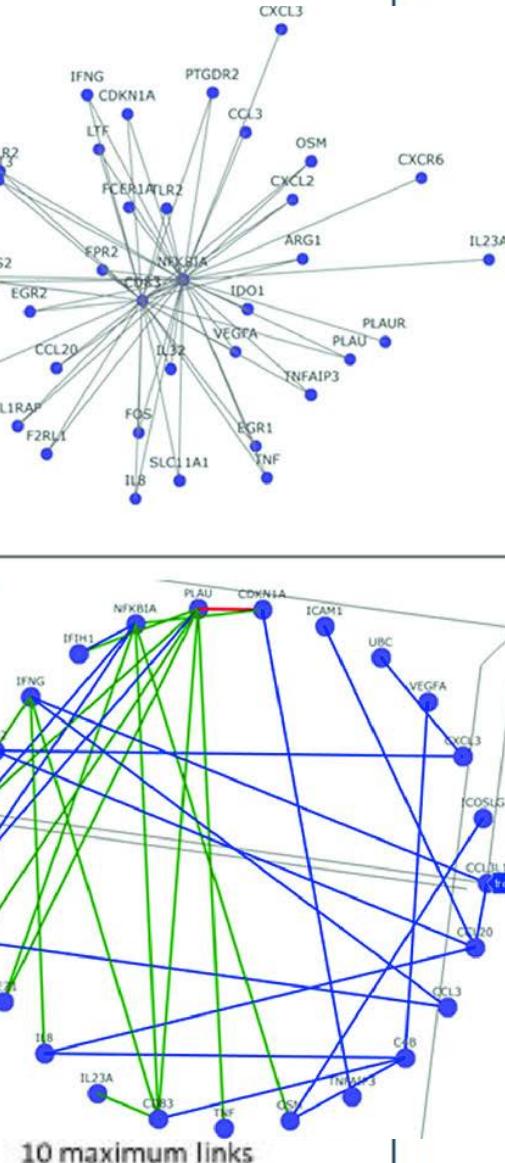
A

B

C

D

KIR_Activating_Subgroup_1





Login Page:

Freely available in <https://khaos.uma.es/fimedV2/>

Username

iwbbio

Password

demo

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Sign up

If you encounter any problem, contact us using this email address: khaos@lcc.uma.es



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ASK FOR A DEMO

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IWBBIO 2022



Thanks you!

ismael@uma.es

