

Introduction to Babelomics 5

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GDA

International Course on
Genomic Data Analysis



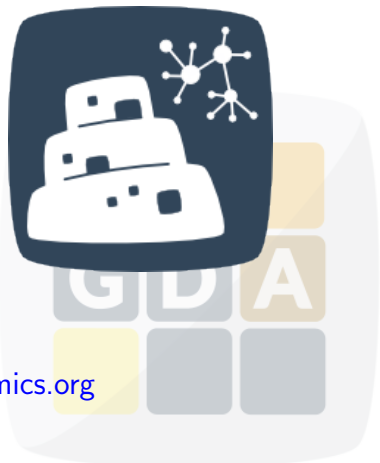
PRINCIPE FELIPE
CENTRO DE INVESTIGACION

Babelomics 5

Babelomics 5

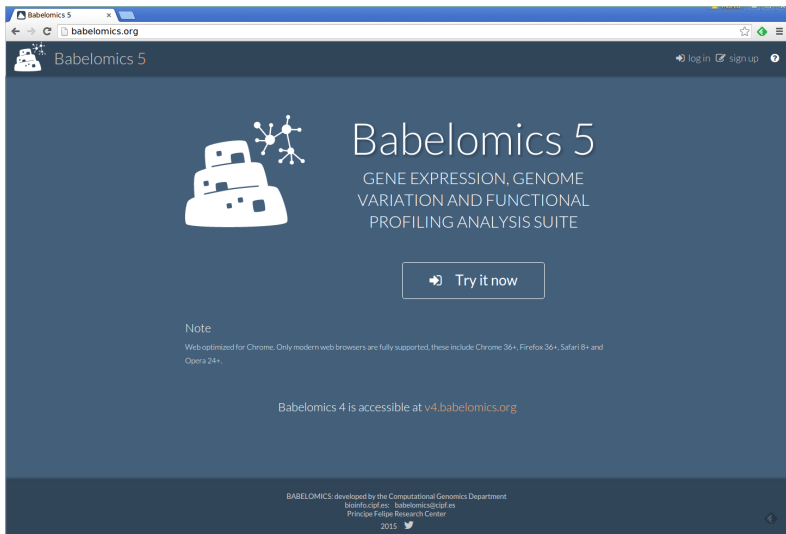
Integrative open source platform with advanced functional profiling for the analysis of

- Transcriptomics
- Proteomics
- Genomics



<http://www.babelomics.org>

Babelomics 5



The screenshot shows the homepage of Babelomics 5. The browser address bar displays 'babelomics.org'. The page features a dark blue background with a white icon of a laboratory instrument and a network diagram. The main heading is 'Babelomics 5' followed by the subtitle 'GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE'. A 'Try it now' button is prominently displayed. A 'Note' section provides browser compatibility information. At the bottom, there is a footer with development details and a 2015 copyright notice.

Babelomics 5

GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE

[Try it now](#)

Note

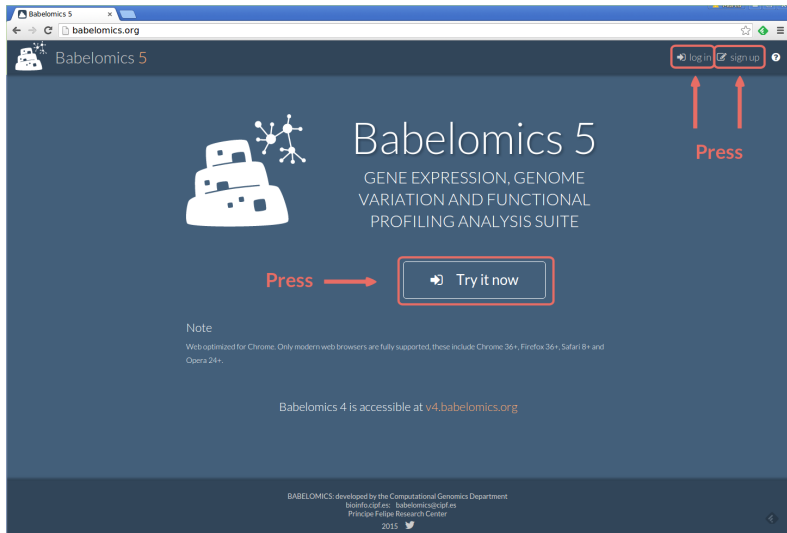
Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+.

Babelomics 4 is accessible at v4.babelomics.org

BABELOMICS: developed by the Computational Genomics Department
bioinfo.cipf.es: babelomics@cipf.es
Príncipe Felipe Research Center

2015

Logging in



The screenshot shows the Babelomics 5 website interface. At the top right, there are two buttons: "log in" and "sign up", both highlighted with red boxes. Red arrows point from the word "Press" below to these buttons. In the center of the page, there is a large "Try it now" button, also highlighted with a red box, with a red arrow pointing to it from the word "Press" on the left. The website header includes the Babelomics logo and the text "Babelomics 5". The main content area features a stylized icon of a laboratory instrument and the text "Babelomics 5 GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE". Below this, there is a "Note" section with text about browser compatibility. At the bottom, there is a link to "Babelomics 4" and footer information including the development department and year.

log in sign up

Press

Press → Try it now

Note

Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+.

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biainfo.cif.es babelomics@cif.es
Príncipe Felipe Research Center
2015

Logging in

- **Try it now:** Enter as anonymous user
- **Sign up:** Create an identified user
- **Log in:** Log in as identified user



Logging in

- **Try it now:** Enter as anonymous user
- **Sign up:** Create an identified user
- **Log in:** Log in as identified user

Anonymous user

- Can access all functionalities and tools
- Data will be lost

Identified user

- Can access all functionalities and tools
- 10Gb of free disk

Logging in

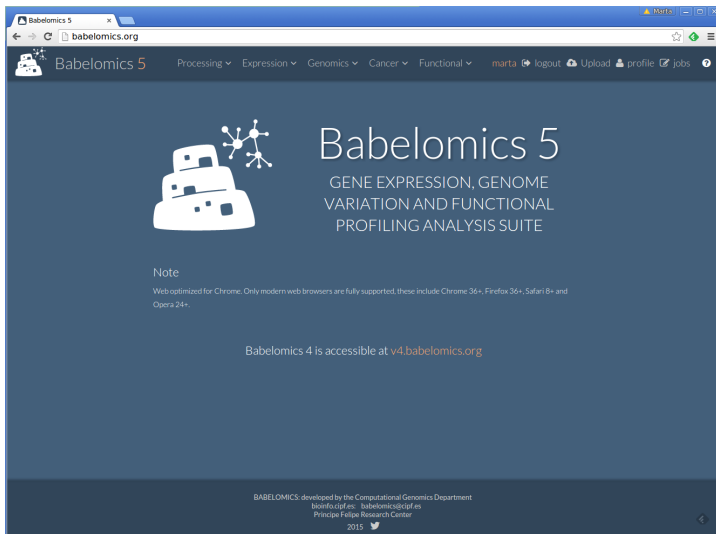
Exercise

Create a new account for yourself

- 1 Go to [Babelomics 5](#)
- 2 Create a new user

For help, ask or visit the [logging in tutorial](#)


Web structure



The screenshot shows the Babelomics 5 web application interface. The browser address bar displays "babelomics.org". The navigation menu includes "Processing", "Expression", "Genomics", "Cancer", "Functional", "marta", "logout", "Upload", "profile", and "jobs". The main content area features a white icon of a server tower and a network diagram. The title "Babelomics 5" is prominently displayed, followed by the subtitle "GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE". A "Note" section states: "Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+." Below this, it says "Babelomics 4 is accessible at v4.babelomics.org". The footer contains the text: "BABELOMICS: developed by the Computational Genomics Department, bioinfo.cipf.es: babelomics@cipf.es, Principe Felipe Research Center, 2015".

Babelomics 5

Processing ▾ Expression ▾ Genomics ▾ Cancer ▾ Functional ▾ marta ↗ logout Upload profile jobs



Babelomics 5

GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE

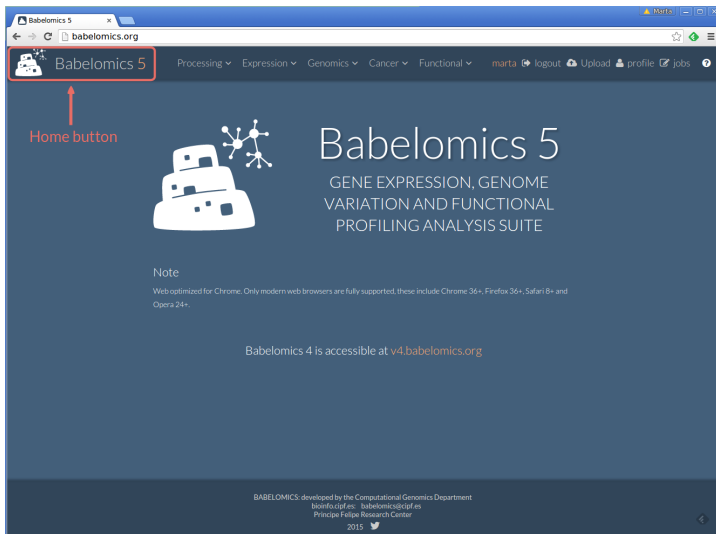
Note

Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+.

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2015

Web structure



The screenshot shows a web browser window with the address bar displaying `babelomics.org`. The page header features a navigation menu with items: Processing, Expression, Genomics, Cancer, Functional, marta, logout, Upload, profile, and jobs. A red box highlights the 'Babelomics 5' logo in the top left, with a red arrow pointing to it and the text 'Home button' below. The main content area has a dark blue background and includes a white icon of a server tower and a network diagram. The title 'Babelomics 5' is prominently displayed, followed by the subtitle 'GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE'. A 'Note' section states: 'Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+'. A link for 'Babelomics 4' is provided at `v4.babelomics.org`. The footer contains development information: 'BABELOMICS: developed by the Computational Genomics Department, bioinfo.cipf.es: babelomics@cipf.es, Principe Felipe Research Center, 2015'.

Babelomics 5

Processing Expression Genomics Cancer Functional marta logout Upload profile jobs

Home button

Babelomics 5

GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE

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Principe Felipe Research Center
2015

Web structure

The screenshot shows the Babelomics 5 web application in a browser window. The browser's address bar displays "babelomics.org". The application's navigation bar includes a "Babelomics 5" logo (a white house icon) and a menu with categories: "Processing", "Expression", "Genomics", "Cancer", and "Functional". To the right of the menu are user options: "marta", "logout", "Upload", "profile", and "jobs".

Below the navigation bar, the main content area features the text "Analysis tools" in red. A red arrow points from the text "Home button" to the Babelomics 5 logo. The main heading is "Babelomics 5" in large white font, followed by the subtitle "GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE" in smaller white font. To the left of the text is a white icon of a house with a network diagram above it.

A "Note" section follows, stating: "Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+."

At the bottom of the main content area, it says: "Babelomics 4 is accessible at v4.babelomics.org".

The footer contains the text: "BABELOMICS: developed by the Computational Genomics Department
bioinfo.cipf.es: babelomics@cipf.es
Principe Felipe Research Center
2015" with a Twitter icon.

Web structure


The screenshot shows the Babelomics 5 web application interface. The browser address bar displays "babelomics.org". The navigation bar includes a "Babelomics 5" logo, a menu with "Processing", "Expression", "Genomics", "Cancer", and "Functional", and a "marta logout" button. The main content area features a "Home button" with an upward-pointing arrow, an illustration of a server tower, and the text "Babelomics 5 GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE". A "Note" section states: "Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+." Below this, it says "Babelomics 4 is accessible at v4.babelomics.org". The footer contains the text: "BABELOMICS: developed by the Computational Genomics Department bioinfo.cipf.es: babelomics@cipf.es Principe Felipe Research Center 2015".

Babelomics 5

Processing ▾ Expression ▾ Genomics ▾ Cancer ▾ Functional ▾ marta logout Upload profile jobs

Analysis tools Logout

Home button



Babelomics 5

GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE

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2015

Web structure

The screenshot shows the Babelomics 5 web application interface. The browser address bar displays `babelomics.org`. The navigation bar includes a logo, the text "Babelomics 5", a menu with categories: "Processing", "Expression", "Genomics", "Cancer", and "Functional", and user options: "marta", "logout", "Upload", "profile", and "jobs".

Annotations with red arrows point to:

- Home button**: Points to the Babelomics 5 logo.
- Analysis tools**: Points to the menu categories.
- Logout**: Points to the "logout" link.
- Upload**: Points to the "Upload" button.

The main content area features the Babelomics 5 logo (a stylized white building) and the text:

Babelomics 5

GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE

Note
Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+.

Babelomics 4 is accessible at v4.babelomics.org

At the bottom, the footer contains: BABELOMICS: developed by the Computational Genomics Department, bioinfo.cipf.es, babelomics@cipf.es, Principe Felipe Research Center, 2015.

Web structure

The screenshot shows the Babelomics 5 web interface. The browser address bar displays `babelomics.org`. The navigation bar includes a logo, the text "Babelomics 5", and a menu with categories: Processing, Expression, Genomics, Cancer, and Functional. On the right side of the navigation bar, there are links for "marta", "logout", "Upload", "profile", and "jobs".

Annotations with red arrows point to the following elements:

- Home button**: Points to the Babelomics 5 logo.
- Analysis tools**: Points to the menu categories.
- Logout**: Points to the "logout" link.
- Upload**: Points to the "Upload" link.
- Settings**: Points to the "profile" link.

The main content area features the Babelomics 5 logo (a stylized white building) and the text "Babelomics 5" in a large font, followed by "GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE". Below this is a "Note" section stating: "Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+." A link is provided: "Babelomics 4 is accessible at v4.babelomics.org".

The footer contains the text: "BABELOMICS: developed by the Computational Genomics Department, bioinfo.cipf.es: babelomics@cipf.es, Principe Felipe Research Center, 2015".

Web structure

The screenshot shows the Babelomics 5 web interface. The browser address bar displays `babelomics.org`. The navigation bar includes a logo and the text "Babelomics 5", followed by a menu of analysis tools: "Processing", "Expression", "Genomics", "Cancer", and "Functional". On the right side of the navigation bar, there are buttons for "marta", "logout", "Upload", "profile", and "jobs".

Annotations with red arrows point to the following elements:

- Home button**: Points to the "Babelomics 5" logo.
- Analysis tools**: Points to the menu of analysis categories.
- Logout**: Points to the "logout" button.
- Upload**: Points to the "Upload" button.
- Settings**: Points to the "profile" button.
- Jobs panel**: Points to the "jobs" button.

The main content area features the Babelomics 5 logo (a stylized white building) and the text "Babelomics 5 GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE". Below this, there is a "Note" section stating: "Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+." A link is provided: "Babelomics 4 is accessible at v4.babelomics.org".

The footer contains the text: "BABELOMICS: developed by the Computational Genomics Department bioinfo.cipf.es: babelomics@cipf.es Principe Felipe Research Center 2015" with a Twitter icon.

Web structure

The screenshot shows the Babelomics 5 web interface. The browser address bar displays "babelomics.org". The navigation bar includes a "Babelomics 5" logo, a menu with "Processing", "Expression", "Genomics", "Cancer", and "Functional", and user options for "marta", "logout", "Upload", "profile", "jobs", and a help icon. Red arrows point to these elements with labels: "Home button" (pointing to the logo), "Analysis tools" (pointing to the menu), "Logout" (pointing to the "logout" button), "Upload" (pointing to the "Upload" button), "Settings" (pointing to the "profile" button), "Jobs panel" (pointing to the "jobs" button), and "Help" (pointing to the help icon). The main content area features the Babelomics 5 logo, the text "Babelomics 5 GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE", a "Note" section, and a footer with contact information and the year 2015.

Babelomics 5

Processing ▾ Expression ▾ Genomics ▾ Cancer ▾ Functional ▾

marta logout Upload profile jobs

Home button

Analysis tools

Logout

Upload

Settings

Jobs panel

Help

Babelomics 5
GENE EXPRESSION, GENOME VARIATION AND FUNCTIONAL PROFILING ANALYSIS SUITE

Note
Web optimized for Chrome. Only modern web browsers are fully supported, these include Chrome 36+, Firefox 36+, Safari 8+ and Opera 24+.

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Principe Felipe Research Center
2015

Workflow

The screenshot displays the Babalomics 5.0 web interface. The top navigation bar includes the logo, the text "Babalomics 5.0", and a menu with items: Processing, Expression, Genomics, Cancer, and Functional. On the right side of the navigation bar, there are links for "Marta", "login", "Upload", "pro", and "jobs".

The main content area is divided into several sections:

- Examples:** A "Normalization example" button is visible.
- Select your data:** Includes instructions and a "File browser" button with a "default/" link.
- Select gene length file:** Includes instructions and a "File browser" button with a "default/" link.
- Normalization method:** Features radio buttons for "Choose automatically the normalization method" (selected), "Choose manually the normalization method", "TMM", and "RPKM".
- Job information:** Includes an "Output folder:" section with a "File browser" button and "default/" link, and input fields for "Job name:" (containing "JobName") and "Description:" (containing "Job info...").

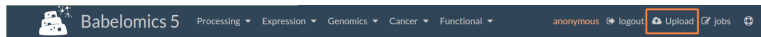
At the bottom of the configuration area is a "Launch job" button. On the right side, a sidebar shows a list of jobs, including "Differential expression - Class comparison demo (correlation.txt) class-comparis...", "Differential expression - Class comparison demo (correlation.txt) class-comparis...", "Essential genes in cancer cell line K562 network-miner", "Downregulated snow", "fluorouridine_dataset fatiscan", and "JobName fatigo".

Numbered callouts (1-9) are placed over the interface to highlight specific elements:

- 1: Jobs list sidebar
- 2: Functional menu item
- 3: Single enrichment menu item
- 4: Gene set network enrichment menu item
- 5: Babalomics 5.0 logo
- 6: Launch job button
- 7: Jobs link in top navigation
- 8: Differential expression - Class comparison demo (correlation.txt) class-comparis... job entry
- 9: Differential expression - Class comparison demo (correlation.txt) class-comparis... job entry

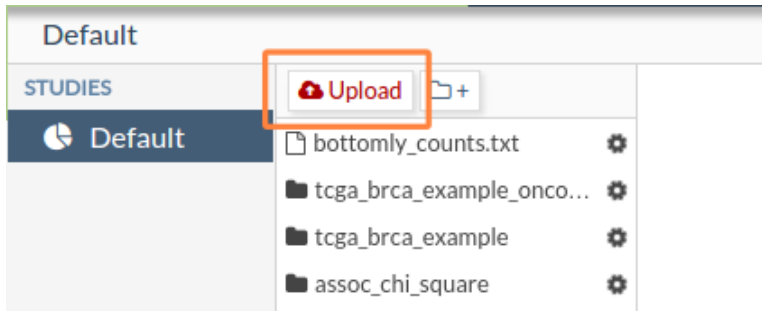
Uploading data

Uploading data tutorial



Uploading data

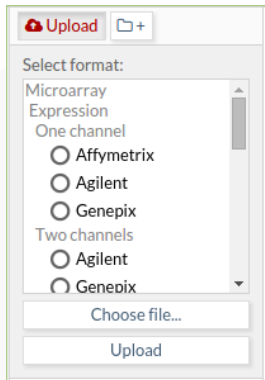
Uploading data tutorial



Uploading data

Uploading data tutorial

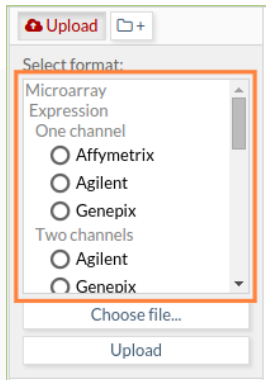
- Bioformat, [more info](#)
 - RNA-Seq: Data Matrix
- **IMPORTANT:** First row with rownames must begin with #NAMES
- We can remove files



Uploading data

Uploading data tutorial

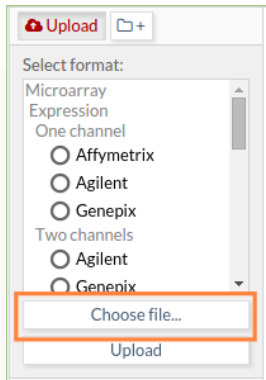
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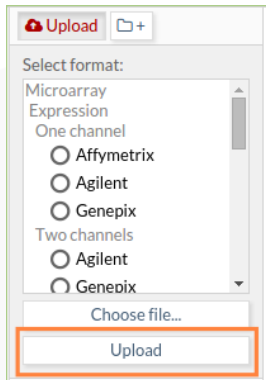
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Uploading data

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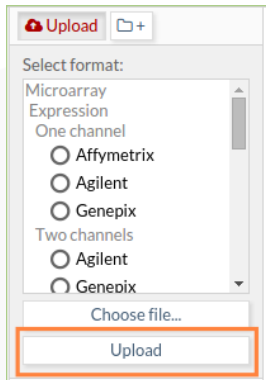
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Uploading data

Uploading data tutorial

- Bioformat, [more info](#)
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Uploading data

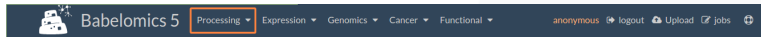
Exercise

We will work with a breast cancer dataset from The Cancer Genome Atlas (TCGA). The expression matrix contains raw counts

- 1 Go to the [GDA 2016 wiki](#)
- 2 Download the *brca_demo_counts_4babelomics.txt*
- 3 Upload this file to Babelomics 5

For help, ask or visit the [uploading data tutorial](#)

Editing data



Editing data

Processing ▾ Expression ▾ Genomics ▾ Cancer ▾ Functional ▾

Normalization

NGS

▶ RNA-Seq

Microarray one channel

▶ Affymetrix

▶ Agilent

▶ Genepix

Microarray two channels

▶ Agilent

▶ Genepix

Edit

▶ Edit your uploaded data


Data Matrix

▶ Pre-processing

Editing data

Select your data

The files must be on the server to select them.

You can upload files using the button  inside file browser.

File browser

default/

Editing data

Edit attributes

Add new attribute

Categorical ▼

Attribute name +

Delete attribute

#NAMES ▼ ✕

#NAMES
A_1.bam
A_2.bam
B_1.bam
B_2.bam

Editing data

Edit attributes

Add new attribute

Categorical

Attribute name +

Delete attribute

#NAMES

#NAMES

A_1.bam

A_2.bam

B_1.bam

B_2.bam

Editing data

Edit attributes

Add new attribute

Categorical ▼

Attribute name +

Delete attribute

#NAMES ▼ ✕

#NAMES
A_1.bam
A_2.bam
B_1.bam
B_2.bam

Editing data

Edit attributes

Add new attribute
Categorical ▼

group +

Delete attribute
#NAMES ✕

#NAMES
A_1.bam
A_2.bam
B_1.bam
B_2.bam

Editing data

Edit attributes

Add new attribute	#NAMES	group
Categorical	A_1.bam	
Attribute name <input type="text"/> +	A_2.bam	
Delete attribute	B_1.bam	
#NAMES <input type="text"/> x	B_2.bam	

Editing data

Edit attributes

Add new attribute

Categorical

Attribute name

+

Delete attribute

#NAMES

×

#NAMES	group
A_1.bam	0
A_2.bam	0
B_1.bam	1
B_2.bam	

G D A

Navigation icons: back, forward, search, etc.

Editing data

Edit attributes

Add new attribute

Categorical ▼

Attribute name +

Delete attribute

#NAMES ▼ ✖

#NAMES
A_1.bam
A_2.bam
B_1.bam
B_2.bam

Editing data

Edit attributes

Add new attribute
Categorical

Attribute name +

Delete attribute
#NAMES

#NAMES
A_1.bam
A_2.bam
B_1.bam
B_2.bam

4s < 1 of 1 >

Save attributes Reset changes

Editing data

Exercise

The dataset of breast cancer contains healthy and tumor samples. Annotate to which class belongs each sample

- 1 Go to the [GDA 2016 wiki](#)
- 2 Download the *BRCA_Normal-Basal_ED.txt*
- 3 Edit the former file with the data in this experimental design

For help, ask or visit the [editing data tutorial](#)



Enjoy Babebloemics 5!

