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# **Technical Documentation**

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# TABLE OF CONTENTS

<b>I</b>	<b>The Emotions Tool</b>	<b>1</b>
<b>1</b>	<b>Quick Start</b>	<b>3</b>
1.1	Installation . . . . .	3
1.1.1	From source with CMake . . . . .	3
1.2	Usage . . . . .	3
<b>2</b>	<b>Code Documentation</b>	<b>5</b>
2.1	The Entry Point . . . . .	5
2.2	The CLI . . . . .	5
2.3	The Exit Codes . . . . .	6
2.4	The Data URI . . . . .	6
2.5	The Base64 Utilities . . . . .	7
<b>II</b>	<b>The Browser Extension</b>	<b>9</b>
<b>3</b>	<b>The Browser Extension</b>	<b>11</b>
<b>III</b>	<b>The Server</b>	<b>13</b>
<b>4</b>	<b>Introduction</b>	<b>15</b>
4.1	Folder Structure . . . . .	15
<b>5</b>	<b>The Data Processor</b>	<b>17</b>
<b>6</b>	<b>The Survey</b>	<b>19</b>
<b>IV</b>	<b>The Data Analyzer</b>	<b>21</b>
<b>7</b>	<b>Quick Start</b>	<b>23</b>
7.1	Installation . . . . .	23
7.2	Usage . . . . .	23
7.2.1	The Command Line Interface . . . . .	23
	Positional Arguments . . . . .	24
	Optional Arguments . . . . .	24
7.2.2	The Code API . . . . .	24
<b>8</b>	<b>Code Documentation</b>	<b>25</b>

8.1	Module: cli . . . . .	25
8.2	Module: data . . . . .	25
8.3	Module: plotting . . . . .	25
<b>V</b>	<b>License</b>	<b>27</b>
<b>9</b>	<b>GNU Free Documentation License</b>	<b>31</b>
9.1	0. Preamble . . . . .	31
9.2	1. Applicability and Definitions . . . . .	31
9.3	2. Verbatim Copying . . . . .	33
9.4	3. Copying in Quantity . . . . .	33
9.5	4. Modifications . . . . .	33
9.6	5. Combining Documents . . . . .	35
9.7	6. Collections of Documents . . . . .	35
9.8	7. Aggregation with Independent Works . . . . .	35
9.9	8. Translation . . . . .	36
9.10	9. Termination . . . . .	36
9.11	10. Future Revisions of this License . . . . .	36
9.12	11. Relicensing . . . . .	37
	9.12.1 ADDENDUM: How to use this License for your documents . . . . .	37
<b>10</b>	<b>GNU General Public License</b>	<b>39</b>
10.1	0. Definitions . . . . .	40
10.2	1. Source Code . . . . .	40
10.3	2. Basic Permissions . . . . .	41
10.4	3. Protecting Users' Legal Rights From Anti-Circumvention Law . . . . .	41
10.5	4. Conveying Verbatim Copies . . . . .	42
10.6	5. Conveying Modified Source Versions . . . . .	42
10.7	6. Conveying Non-Source Forms . . . . .	42
10.8	7. Additional Terms . . . . .	44
10.9	8. Termination . . . . .	45
10.10	9. Acceptance Not Required for Having Copies . . . . .	45
10.11	10. Automatic Licensing of Downstream Recipients . . . . .	45
10.12	11. Patents . . . . .	46
10.13	12. No Surrender of Others' Freedom . . . . .	47
10.14	13. Use with the GNU Affero General Public License . . . . .	47
10.15	14. Revised Versions of this License . . . . .	47
10.16	15. Disclaimer of Warranty . . . . .	47
10.17	16. Limitation of Liability . . . . .	48
10.18	17. Interpretation of Sections 15 and 16 . . . . .	48
	10.18.1 How to Apply These Terms to Your New Programs . . . . .	48
	<b>Python Module Index</b>	<b>51</b>
	<b>Index</b>	<b>53</b>

## **Part I**

# **The Emotions Tool**



## QUICK START

### 1.1 Installation

To use the tool, download its compiled binary from the repository and execute it from a console.

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**Important:** The tool has been tested on **Ubuntu Xenial 16.04**.

The **Affdex SDK** is only available on Windows and Ubuntu Xenial 16.04, so compatibility with other Operative Systems is not guaranteed.

---

#### 1.1.1 From source with CMake

Clone and open the [GitHub repository](#) in a console, using the following commands:

```
git clone https://github.com/espositoandrea/Bachelor-Thesis.git
cd Bachelor-Thesis
```

Open the directory containing the tool's source code:

```
cd emotions
```

Finally, create and compile the CMakeProject:

```
mkdir bin
cd bin
cmake -G "CodeBlocks - Unix Makefiles" ..
make
```

### 1.2 Usage

---

**Important:** To use the tool you must have the **Affdex SDK** installed on your machine. Then, you have to add `/path/to/affdex-sdk/lib` to the variable `$LD_LIBRARY_PATH` (on Ubuntu).

```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/path/to/affdex-sdk/lib/
```

---

The tool will then search, in its folder, for the folder `lib/affdex-sdk/data/` (that has to contain the data used by Affdex).

---

The tool can be used through CLI (or executed by another script).

```
./emotions [<option>...] IMAGE...  
./emotions [<option>...] --file FILE
```

Where IMAGE is a *data URI*. The available options are:

- h, --help**                      Get the help message
- f FILE, --file FILE**    The file containing the images to be analyzed (as a data URI)



## CODE DOCUMENTATION

### 2.1 The Entry Point

The main file.

This file is the main file of the tool.

**Author** Andrea Esposito <[github.com/espositoandrea](https://github.com/espositoandrea)>

#### Functions

int **main** (int *argc*, char \*\**argv*)

The main entry point.

This is the entry point of the tool.

**Return** An *exit code* based on the execution.

#### Parameters

- *argc*: The length of *argv*.
- *argv*: The array of arguments given through the command line.

### 2.2 The CLI

*exit\_codes* **setup\_options** (int *argc*, char \*\**argv*, std::vector<std::string> &*images*)

Set up the tool's options and arguments.

This function is responsible of the CLI API of the tool. It sets and handles the available options and arguments.

**Return** An *exit code*:

- *exit\_codes::OK* If the given arguments are valid and no errors occurred.
- *exit\_codes::HALT* If the given arguments are valid but the argument combination stops the execution.
- *exit\_codes::ARGUMENT\_ERROR* If the given arguments are invalid
- *exit\_codes::UNKNOWN\_ARGUMENT\_ERROR* If an unknown error occurred.

#### Parameters

- `argc`: The length of `argv`.
- `argv`: The array of arguments passed via CLI.
- `images`: A variable that will contain the images passed through the CLI API.

## 2.3 The Exit Codes

### **enum exit\_codes**

A collection of all the exit codes of the tool.

This enum contains all the (expected) exit codes of the tool.

*Values:*

**OK** = 0

The tool exited with no error completing its tasks.

**HALT** = 1

The tool exited with no error, but without completing its tasks.

**ARGUMENT\_ERROR** = 2

The tool exited due to errors in the given arguments.

**UNKNOWN\_ARGUMENT\_ERROR** = 3

The tool exited due to unknown errors while parsing the arguments.

## 2.4 The Data URI

### **class data\_uri**

A utility class to handle data URIs.

This class represents a data URI. A data URI is defined by [MDN](#) as a string with the following syntax: `data:[<mediatype>][;<base64>],<data>`.

### Public Functions

**data\_uri** (**const** std::string &*s*)

The class constructor.

This constructor creates a *data\_uri* from a string.

#### Parameters

- *s*: The string representing the data uri.

#### Exceptions

- `data_uri::string_not_uri`: if *s* is not a valid data URI.

std::string **get\_type** () **const**

Get the media type.

This function returns the media type of the data URI.

**Return** The media type (`<mediatype>` in `data:<mediatype>;base64,<data>`).

`std::string get_data () const`

Get the data.

This function returns the data contained in the data URI.

**Return** The data (`<data>` in `data:<mediatype>;base64,<data>`).

`std::string get_uri () const`

Get the URI.

This function returns the entire URI as a string.

**Return** The URI as a string.

## Public Static Functions

`bool is_data_uri (const std::string &s)`

Check if a string is a data URI.

The function checks if a string is in the format `data:<mediatype>;base64,<data>`.

**Return** True if `s` is a data URI, false otherwise.

### Parameters

- `s`: The string to be checked

`class string_not_uri : public exception`

An exception raised if a string is not an URI.

This exception is thrown if a string, assumed to be one, is not a data URI.

## 2.5 The Base64 Utilities

### `namespace base64`

Namespace for dealing with *base64* strings.

This namespace contains utilities to deal with *base64* strings.

### Functions

`std::string encode (const std::string &s)`

Encode a string to *base64*.

This function encodes a string to a *base64* string.

**Return** The encoded string.

### Parameters

- `s`: The string to be encoded.

`std::string encode (unsigned char const *s, unsigned int len)`

Encode a string to *base64*.

This function encodes a string to a *base64* string.

**Return** The encoded string.

**Parameters**

- `s`: The string to be encoded.
- `len`: The length of the string `s`.

`std::string decode (std::string const &s)`

Decode a *base64* string.

This function decodes a *base64* string to a binary string.

**Return** The decoded string.

**Parameters**

- `s`: The string to be decoded.

## **Part II**

# **The Browser Extension**



## THE BROWSER EXTENSION





## **Part III**

# **The Server**



## INTRODUCTION

### 4.1 Folder Structure

The `server/` folder contains all the source code of the developed server. Its structure is the following (all described folders are subfolders of `server/`).

**views/** This folder contains all the views developed for the server.

**views/layouts/** This folder contains the layouts used to define the views.

**survey/** This folder contains all the required data for the survey.

**assets/** This folder contains all the static files that will be served without any modification.

**assets/images/** A folder that contains all the images and illustrations used.

**assets/js/** A folder that contains all the external JavaScript files (needed by the extension).

**assets/style/** A folder that contains all the stylesheets of the server (written in [SASS](#)).



## THE DATA PROCESSOR



## THE SURVEY

The survey is generated using the exported object defined in the module `survey-data.js`. Here is documented the structure of that object.

**class Survey()**

The survey configuration object.

### Arguments

- **introduction** (*string*) – The introduction to the survey. Treated as raw HTML.
- **sections** (*Array.<Section>*) – The survey's sections.

**class Section()**

A section of the survey.

### Arguments

- **title** (*string*) – The section's title.
- **questions** (*Array.<Question>*) – The section's questions.

**class Question()**

A question of the survey. @extends BasicQuestion.

### Arguments

- **type** (*string*) – The type of question.
- **rules** (*Object*) – Various additional rules. Can be any HTML attribute accepted by the current input type.
- **placeholder** (*string*) – The input placeholder.
- **choices** (*Array.<string>*) – A list of choices. Used only if type is 'choice'.
- **question** (*string|Array.<BasicQuestion>*) – If it's a string, the same as BasicQuestion.question. If an array of BasicQuestion, a list of questions used if type is 'likert'.

**class BasicQuestion()**

A basic question of the survey. This class contains all the required field of a question.

### Arguments

- **question** (*string*) – The question that will be asked to the user.
- **name** (*string*) – The name of the GET/POST parameter.

- **required** (*boolean*) – Whether or not the input is required.



# **Part IV**

## **The Data Analyzer**



## QUICK START

### 7.1 Installation

To install the tool, download the tool's folder and execute the following commands (replace `/path/to/analyzer/` with the path to the downloaded folder).

Listing 1: How to install the tool

```
cd /path/to/analyzer
python3 -m pip install .
```

### 7.2 Usage

#### 7.2.1 The Command Line Interface

Once installed you can use this tool from your terminal using the command `analyzer`.

Listing 2: The tool's CLI

```
analyzer [-h] [--version] [-v] file users
```

---

**Note:** You can execute the tool as a Python module, without installing it first. Download the tool's folder and execute the following commands (replace `/path/to/analyzer/` with the path to the downloaded folder).

Listing 3: How to execute the tool as a Python module

```
cd /path/to/analyzer  
python3 -m analyzer --help
```

---

Process the JSON file

### Positional Arguments

**file** The file

**users** A JSON file containing the users

### Optional Arguments

<b>-h, --help</b>	show this help message and exit
<b>--version</b>	output version information and exit
<b>-v, --verbose</b>	increase output verbosity

### 7.2.2 The Code API

Once installed you can use the tool as a Python module. Read the [code documentation](#) for more information on the API.

## CODE DOCUMENTATION

### 8.1 Module: cli

### 8.2 Module: data

```
class analyzer.data.Interaction (_id: str, user_id: str, timestamp: int, url: str,  
                                mouse: analyzer.data.base.MouseData, scroll:  
                                analyzer.data.base.ScrollData, keyboard: ana-  
                                lyzer.data.base.KeyboardData, emotions: ana-  
                                lyzer.data.emotions.Emotions)  
  
class analyzer.data.User (_id: str, age: int, internet: int, gender: str)  
  
class analyzer.data.Website (url: urllib.parse.ParseResult, count: int = 0, category:  
                             str = 'UNKNOWN')
```

### 8.3 Module: plotting



# **Part V**

## **License**





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**Note:** This documentation is released under the *GNU FDLv1.3*. All the source code (both in this document and in the entire repository) is released under the *GNU GPLv3*.

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If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

```
<program> Copyright (C) <year> <name of author> This program comes with ABSO-
LUTELY NO WARRANTY; for details type 'show w'. This is free software, and you
are welcome to redistribute it under certain conditions; type 'show c' for details.
```

The hypothetical commands *show w* and *show c* should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

You should also get your employer (if you work as a programmer) or school, if any, to sign a "copyright disclaimer" for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see <<http://www.gnu.org/licenses/>>.

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## PYTHON MODULE INDEX

### a

`analyzer.data`, [25](#)





## A

`analyzer.data` (*module*), 25  
`ARGUMENT_ERROR` (*C++ enumerator*), 6

## B

`base64` (*C++ type*), 7  
`base64::decode` (*C++ function*), 8  
`base64::encode` (*C++ function*), 7, 8  
`BasicQuestion()` (*class*), 19

## D

`data_uri` (*C++ class*), 6  
`data_uri::data_uri` (*C++ function*), 6  
`data_uri::get_data` (*C++ function*), 7  
`data_uri::get_type` (*C++ function*), 6  
`data_uri::get_uri` (*C++ function*), 7  
`data_uri::is_data_uri` (*C++ function*), 7  
`data_uri::string_not_uri` (*C++ class*),  
7

## E

`exit_codes` (*C++ enum*), 6

## H

`HALT` (*C++ enumerator*), 6

## I

`Interaction` (*class in analyzer.data*), 25

## M

`main` (*C++ function*), 5

## O

`OK` (*C++ enumerator*), 6

## Q

`Question()` (*class*), 19

## S

`Section()` (*class*), 19  
`setup_options` (*C++ function*), 5  
`Survey()` (*class*), 19

## U

`UNKNOWN_ARGUMENT_ERROR` (*C++ enumerator*), 6  
`User` (*class in analyzer.data*), 25

## W

`Website` (*class in analyzer.data*), 25