



User Guide

IS 428 Visual Analytics for Business Intelligence

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22 November 2013



Revision Sheet

Release No.	Date	Revision Description
Rev. 0	18/11/16	User Guide creation
Rev. 1	22/11/16	Update of screenshots

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1.0 General Information

This section provides an overview of the application and the purpose for which it is intended.

1.1 Application Overview

CATalytics (Colleges and Tertiaries Analytics) is a visual analytics web tool which allows the exploration and analysis of Times Higher Education (THE) World University Rankings. This application is a server-based dashboard, with Web-based capabilities, that provides an interface for users to interact and manipulate to aid in important decision-making in their respective fields. This application operates on EasyPHP DevServer 14.1 VC9.

1.2 Points of Contact

For informational or troubleshooting purposes, please do not hesitate to contact any of the authors:

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1.3 Organisation of the Guide

The user's manual consists of five sections: General Information, System Summary, Getting Started, Using the System, and Reporting.

The General Information section explains in general terms the system and the purpose for which it is intended.

The Application Summary section provides a general overview of the system. The summary outlines the uses of the system's software requirements, system's configuration, user access levels and system's behaviour in case of any contingencies.

The Getting Started section explains how to get CATalytics and run it on the device. The section presents briefly system menu.

The Using the Application section provides a detailed description of application functions.

1.4 Acronyms and Abbreviations

Acronym/Abbreviation	
PC	Personal Computer
GUI	Graphical User Interface - computer interface that allows users to interact with a device through graphical elements such as pictures and animations, as opposed to text-based commands.
HTML	Hypertext Markup Language - a standardized system for tagging text files to achieve font, colour, graphic, and hyperlink effects on World Wide Web pages
SVG	Scalable Vector Graphics - an XML-based vector image format for two-dimensional graphics with support for interactivity and animation.
CSS	Cascading Style Sheet - used by web pages to help keep information in the proper display format.
DOM	Document Object Model - platform and language-neutral interface that allows programs and scripts to dynamically access and update the content, structure, and style of a document

2.0 Application Summary

This section provides a general overview of the application. The summary outlines the uses of the application's software requirements, application's configuration, user access levels and application's behaviour in case of any contingencies.

2.1 System Configuration

CATalytics operates on PCs with Microsoft Windows, Mac OS X or Linux operating systems (ie. Operating systems which use a GUI). The application requires connection to the Internet in order to access the application from a server and to access embedded hyperlinks. The application can be used on any major Internet browser.

2.2 Data Flows

SVG, HTML5, and CSS standards are used to produce dynamic, interactive data visualizations in web browsers using the D3.js libraries. D3.js aids in attaching data to DOM elements. CSS, HTML5 and/or SVG then showcases this data and the data is then made interactive through the use of D3.js data-driven transformations and transitions.



Figure 1: Overall flow of data in the system

2.3 User Access Levels

Everyone with an internet connection can use the application.

2.4 Contingencies and Alternate Modes of Operation

In case there is no Internet connection available, data cannot be retrieved from the online server and the visualisations will not be able to work.

An alternate mode of operation would be to save the application files on a local server (eg. EasyPHP DevServer 14.1 VC9) and run it through the local server.

3.0 Getting Started

This section explains how to get CATalytics and run it on the PC and presents briefly system menu.

3.1 Accessing the Dashboard

The newest version currently available can be accessed from <http://www.arbowebforest.com/php/android/ArboWebForest.apk>. Double-clicking on the CATalytics.html file will bring users to the dashboard. No download is necessary. For offline viewing, with limited capabilities, users can download the entire CATalytics folder and run it through their local server, such as EasyPHP DevServer 14.1 VC9.

3.2 Application Dashboard

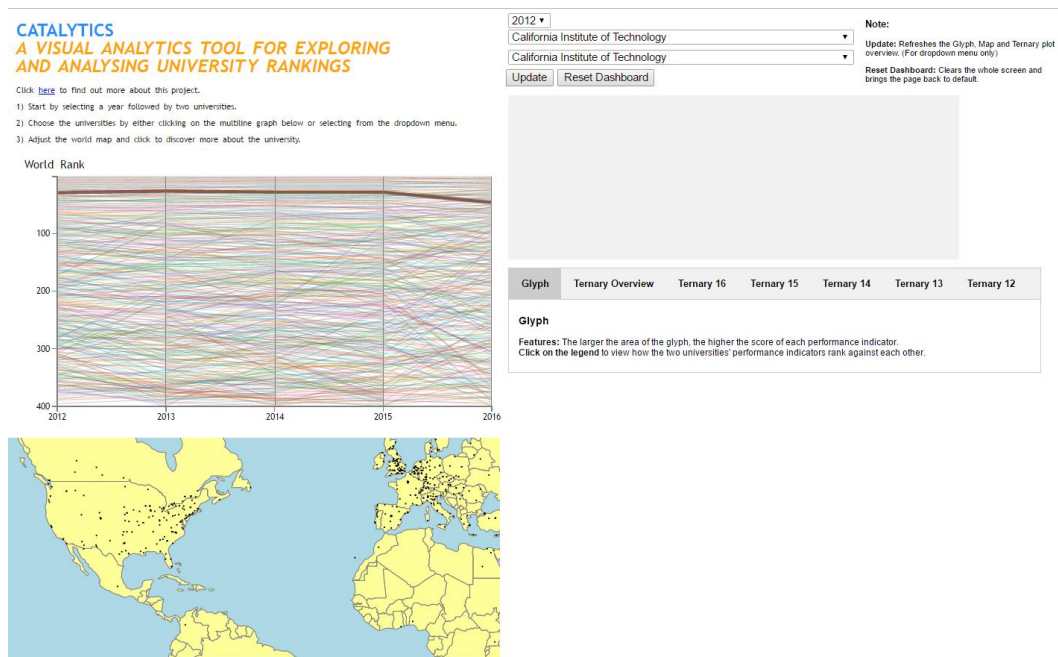


Figure 2 Main dashboard screen

CATalytics is a single-screen dashboard, which consists of 5 main elements - time series graphs, a global map, star plots (glyphs), slope graphs and ternary plots. A dropdown menu is available for selection of 2 universities within a year. Lastly, users are able to find out more about the project by clicking on link below the title of the webpage.

CATALYTICS A VISUAL ANALYTICS TOOL FOR EXPLORING AND ANALYSING UNIVERSITY RANKINGS

Click [here](#) to find out more about this project.

- 1) Start by selecting a year followed by two universities.
- 2) Choose the universities by either clicking on the multiline graph below or selecting from the dropdown menu.
- 3) Adjust the world map and click to discover more about the university.

Figure 3 Link to project background

Users can refresh the dashboard by pressing **F5** on the keyboard or by clicking **Update Dashboard** button on the dashboard. Users can exit the dashboard by exiting the tab on the browser.

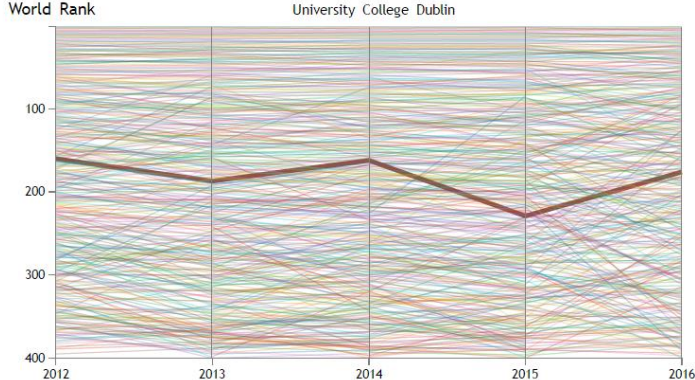
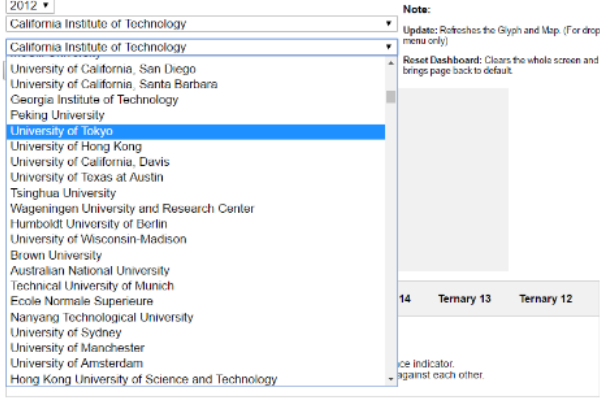
4.0 Using the Application

This section provides a detailed description of application functions.

4.1 Time-series Graph

This visualisation can be used as a base filter for users to select which universities and which year users would like to explore further. This selection will then be reflected on the global map, glyph and ternary plots for comparison purposes and further insights.

Users can select the universities in 2 different methods:

<p>1. By selecting the year from the drop down menu and clicking on the respective line on the time-series graph</p>	 <p>The graph shows World Rank for University College Dublin from 2012 to 2016. The y-axis represents rank from 100 to 400 (inverted), and the x-axis represents years. A prominent dark red line tracks the university's performance, starting around rank 180 in 2012, dipping to 200 in 2013, rising to 170 in 2014, falling to 230 in 2015, and ending at 190 in 2016. Numerous other colored lines represent other universities.</p>
<p>2. By selecting the year and the universities from the drop down menu</p>	 <p>The screenshot shows a dropdown menu for the year 2012. The selected university is California Institute of Technology. Other visible options include University of California, San Diego; University of California, Santa Barbara; Georgia Institute of Technology; Peking University; University of Tokyo; University of Hong Kong; University of California, Davis; University of Texas at Austin; Tsinghua University; Wageningen University and Research Center; Humboldt University of Berlin; University of Wisconsin-Madison; Brown University; Australian National University; Technical University of Munich; Ecole Normale Supérieure; Nanyang Technological University; University of Sydney; University of Manchester; University of Amsterdam; and Hong Kong University of Science and Technology. A 'Note' section on the right contains instructions for the 'Update' and 'Reset Dashboard' buttons.</p>

Upon selection of 2 specific universities within a year, 3 elements will change – the time series graph will reflect only these 2 universities, the global map will update to show just the 2 universities selected and a glyph will appear, displaying the 2 universities on the glyph. If method 1 is employed, this update is automatic. If method 2 is employed, users must click on the “Update” button for the updates to occur.

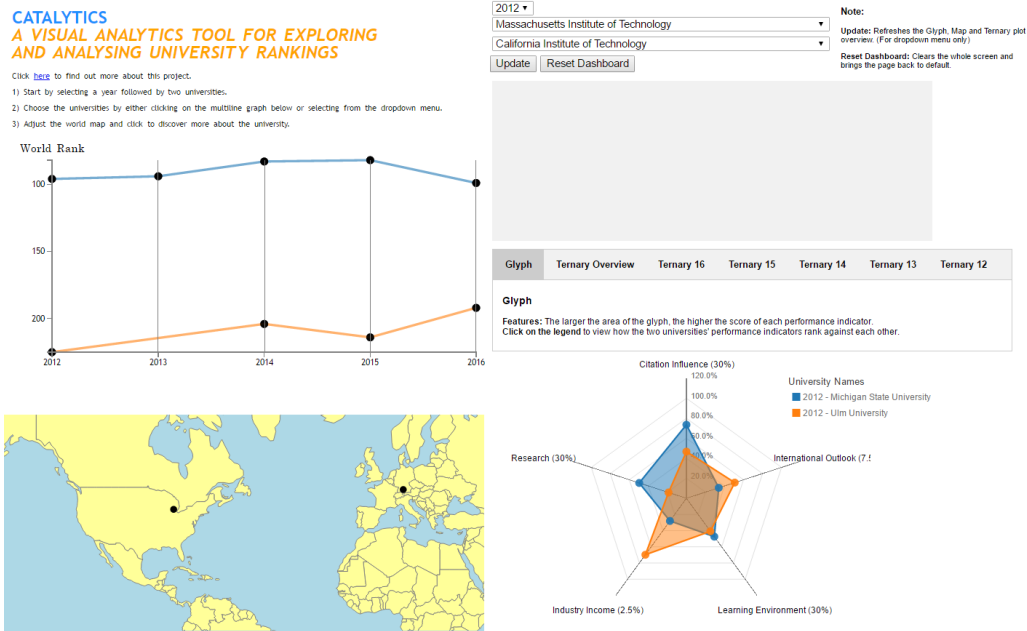


Figure 4 Upon selection of 2 universities

Users can hover over the data points in the time series graph to discover the rank of the particular university in a particular year.

4.2 Global Map

Without any selection, the map will show all the data points (“pins”) of all universities by default.

Upon selection of a universities (as mentioned above), the pins of the selected universities will remain on the map while the unselected universities will not appear. As shown below, a tooltip with the university’s name will appear if users hover over the pin on the map.



Figure 5 Hovering over global map data point

For more information on the university, users can click the pins on the map to be brought to a Google search of the university.

4.3 Star Plot (Glyph)

The “Glyph” tab will be selected by default.

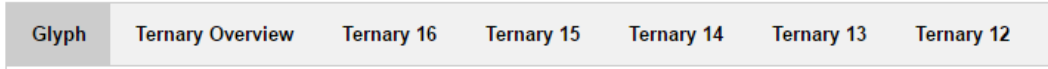


Figure 6 Glyph tab

On the glyph, the higher the score of the respective performance indicator, the closer the data point is to the outside axis. Hovering over one out of the two glyphs will bring forward the specific glyph and make it clearer for the user to see.

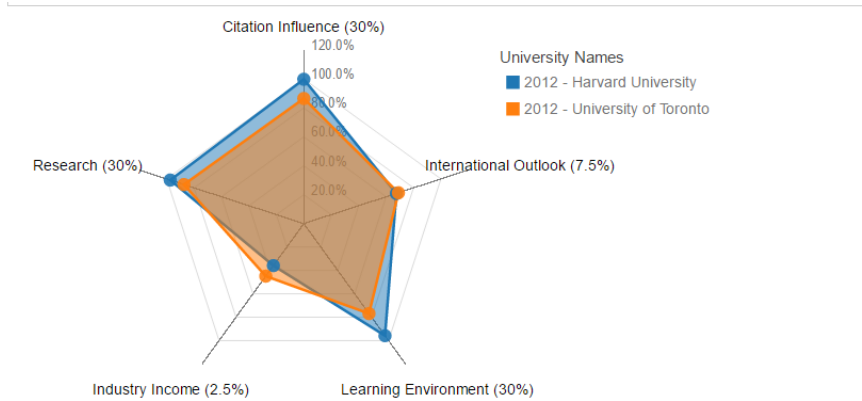


Figure 7 Glyph

Clicking on the legend of the glyph will allow a slope graph to appear. The slope graph will reflect the relative ranking of each performance indicator of a particular university to the other university selected. Clicking the legend again will make the slope graph disappear.

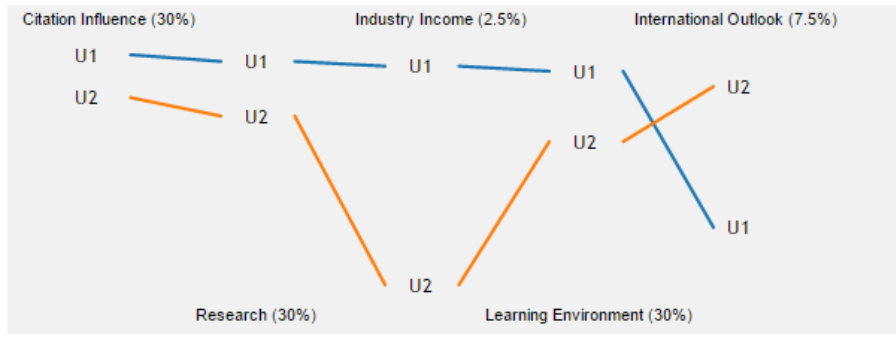


Figure 8 Slope graph

4.4 Ternary Plot

Upon selection of any of the ternary plot tabs, a ternary plot will replace the glyph.

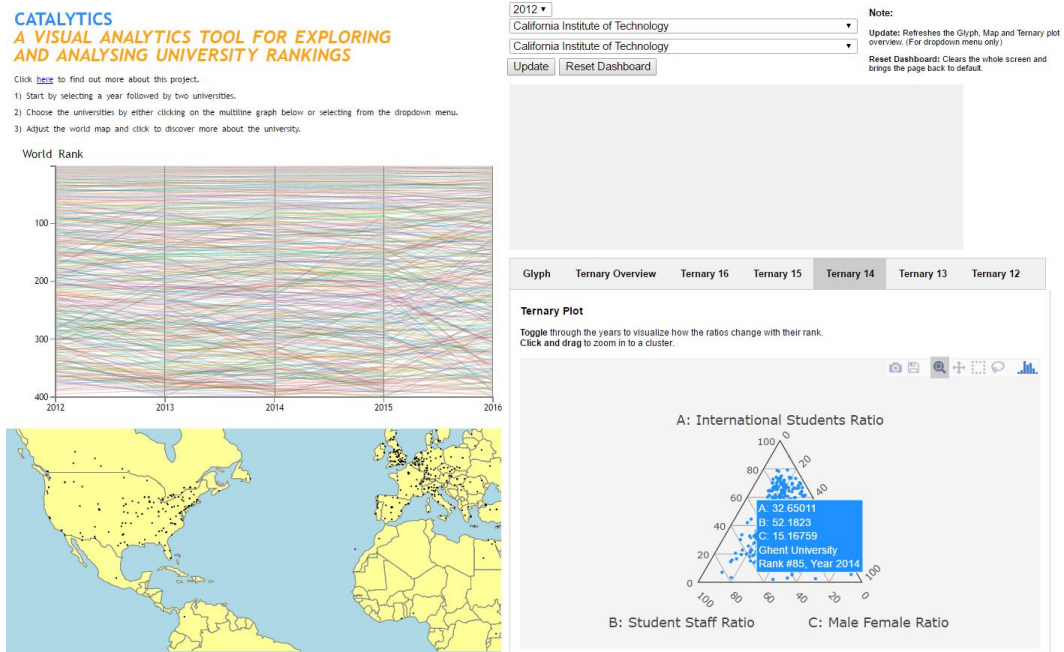


Figure 9 Upon selection of ternary plot

The ternary plot can be viewed from 2 different sets of visual categories – the “Ternary Plot” tab and the “2012 – 2016” tabs.

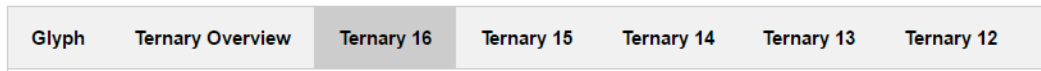


Figure 10 Ternary tab

In all the ternary plots across these tabs, users are able to zoom in onto the ternary plot using a lasso function to study a cluster of universities that need further analysis.

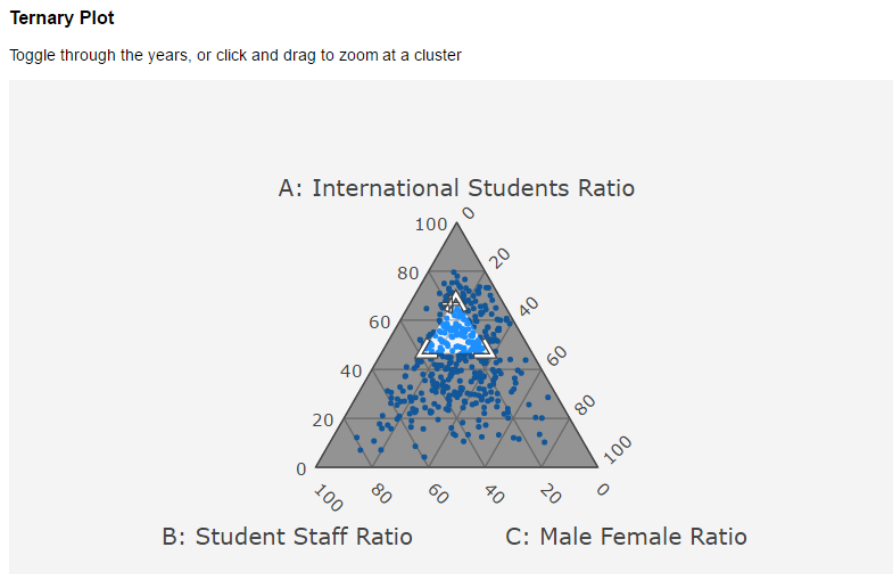


Figure 11 Lasso-ing and zooming into clusters

Hovering over a data point will display general and demographic information of the university.

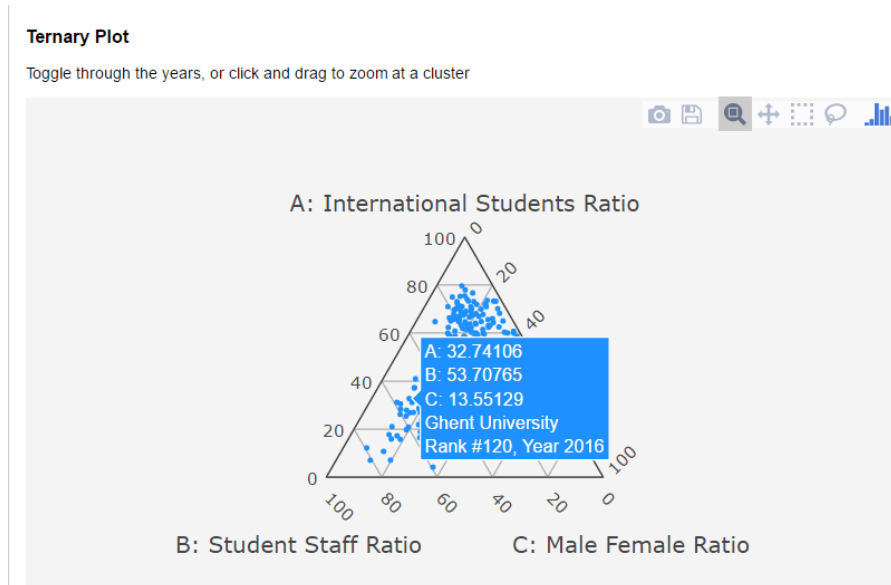


Figure 12 Hovering over a data point on the tooltip

To reset the ternary plot, users can double-click the middle of the ternary plot.

Ternary Plot Tab

Selecting the “Ternary Plot” tab will replace the glyph visualisation with a ternary plot visualisation within the same screen. This visualisation shows users all the universities across all years in a ternary plot.

2012 - 2016 Tabs

Users are able to select a single year, through the other tabs labelled by year, to be displayed on the ternary plot labelled. Each tab will display the ternary plot with universities from that particular year.

4.5 Miscellaneous

Users can reset the dashboard by clicking the “Reset Dashboard” button at the top.

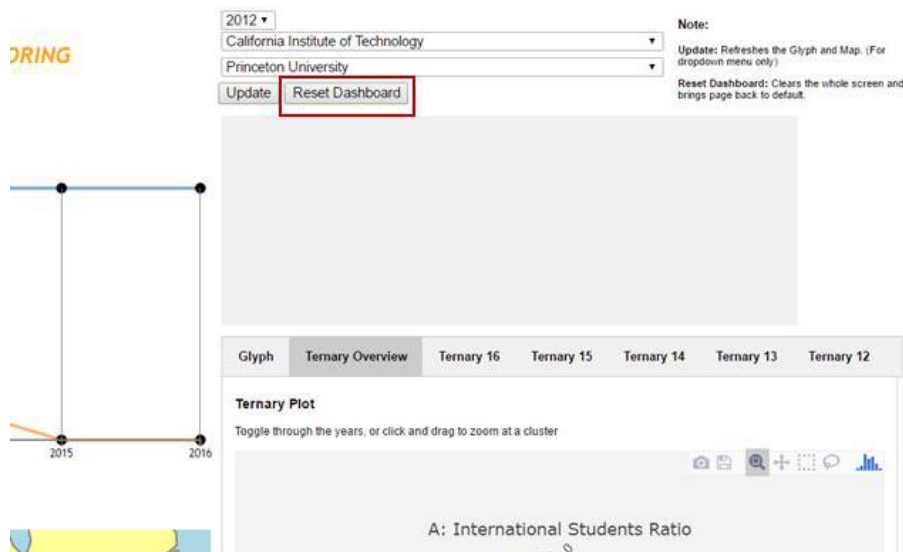


Figure 13 Resetting the dashboard