3DC Standard Setting Application

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Introduction

In this short manual we explain how to use the 3DC standard setting application to perform a standard setting procedure according to the Data Driven Direct Consensus method of standard setting. The 3DC application is quite user friendly. To use the standard setting method and the application, you need people with the following three skill sets, who may but will probably not be the same person.

Leading a standard setting session

No technical know-how is required, but you do need:

- a good understanding of the 3DC method of standard setting
- preferably a good understanding of the subject matter of the test
- to have read the “rater interface” and “group leader interface” parts of this manual

Installing and starting the standard setting application

A person with some technical knowledge of the following subjects:

- how to set up a wired or wireless LAN
- some knowledge about firewalls and IP addresses
- some familiarity with command line programs

Preparation of a standard setting session

A person with basic skills in psychometric analysis, specifically:

- familiarity with the R programming language
- a solid understanding of the 3DC method of standard setting
- either familiar with the R-package Dexter or able to estimate your own score scale and work with relational databases
3DC Method for standard setting

The Data Driven Direct Consensus (3DC) method for standard setting is fully described in Keuning et al. (2017).

Preparing a standard setting session

The preferred way to prepare a standard setting session is to use the R-package Dexter, see Maris et al. (2017). The function create3DC creates a file (a sqlite database) that the standard setting program uses to build the 3DC forms and to save the standards from the panellists. See the help for this function in the Dexter package for more details.

Setting up the standard setting application

The 3DC application is a micro server that serves two html pages: one for the group leader and a different one for the standard setters. It also saves the ratings in the standard setting database and it provides a basic login mechanism.

Requirements

Using the application requires setting up a Local Area Network or a Server. The application has to be installed on the network Master or the Server. If you use a pre-compiled distributable, it will work under the specified operating system(s). If you use a Local Area Network, the application works best with the following minimal system requirements:

- Gigabit Ethernet Switch
- Network master (the computer on which you run the application) should have a:
  - Gigabit Ethernet port
  - Ssd hard drive is advisable in case you plan to use items with lots of media files.

The master computer needs to have windows 7+. The client computers will need Google Chrome version 45 or later (the mobile version has not been tested) with JavaScript enabled. The application will not work in Internet Explorer (tested in version 9) or Mozilla Firefox (tested in version 38).

Installation

Installation of the application is quite easy, copying it to your master computer or server is all the installation that is required. The application can be set up
on an (intranet) Server or a local area network (LAN). In the present version the login mechanism and other security is extremely basic so it is not advisable to run the application on a public server.

**Starting the tool**

It is assumed that you have already created a database for the standard setting.

If you have set the application up on a LAN, be sure to check that there are no firewalls blocking the connections between the computers. In rare cases you might also need to assign static IP addresses to all computers on the LAN. This depends on your system and router settings.

The 3DC application is a command line program. You need to specify the path to the standard setting database and you can specify some options on the command line as well. These options are explained in the help which can be viewed by typing: `sts_server --help`. The group leader and the content experts can log in to the standard setting application by navigating to `[SERVER_ADDRESS]:[PORT]/login` using Google Chrome.

Some examples:

`sts_server demo.sqlite -v qti -i example_package.zip` will start the server using the standard setting database “demo.sqlite”. Items will be displayed using the “qti” item viewer and selected from the package “example_package.zip”.

`sts_server demo2.sqlite -v html -i my_items/demo2 -s 192.168.1.9` will start the server using the standard setting database “demo2.sqlite”. Items will be displayed using the “html” item viewer and selected from the directory “my_items/demo2”. Your users will have to navigate to 192.168.1.9:8080/login to use the standard setting application since you specified your server address to be 192.168.1.9 and the default port is 8080. To get the ip-address of your computer you can type “ipconfig” in the dos dos-box on Microsoft Windows.

`sts_server -h` displays help about the possible options you can use.

**Item viewer**

A big advantage of the 3DC tool is that it enables both the group leader and the participants to easily browse through the items in the different clusters. In this way, there is no misunderstanding which items belong to which clusters and the content materials on which the standards should be based are just a click away. The 3DC tool can display items in html, QTI or picture format.
**Items in QTI format**

The QTI item viewer supports a reasonable subset of the QTI 2.1 standard. Unfortunately, the QTI standard is not implemented in a consistent way across different applications that claim to support it. Please check that all your items are rendered correctly and according to your expectations before performing a standard setting. To view items in QTI format, you start the application in the following way: `sts_server DBNAME -v qti -q PATH_TO_QTI_PACKAGE` where `PATH_TO_QTI_PACKAGE` is the path to a zipped qti package which contains all the items that are used in the standard setting. The item identifiers should correspond to the item id's you used to prepare the standard setting database.

**Items in HTML format**

The html item viewer supports all of the html syntax that your browser supports. To view items in html format, you start the application in the following way: `sts_server DBNAME -v html -i PATH_TO_ITEM_DIR` where `PATH_TO_ITEM_DIR` is the path to a folder with your html files. For security reasons, all resource files (e.g. stylesheets, images) have to be in a subdirectory of this folder. Names of html documents have to correspond to item id's.

**Items in image format**

Screenshots or pictures are also supported. Start the application in the following way: `sts_server DBNAME -v screenshot -i PATH_TO_ITEM_DIR` where `PATH_TO_ITEM_DIR` is the path to a folder with your screenshots. Names of the image files have to correspond to item id's.

**A standard setting session**

The 3DC application consists of two easy to use interactive webpages, one for the group leader and a different one for the panellists. After specifying their credentials (username and password), the group leader and panellists are redirected to their respective pages automatically. These two webpages are described in the following two sections.
Rater Interface

After login, panelists are redirected to a rater page where they can use the standard setting forms and navigate through the items in the tests. The interface is described below.

Choice of tests assigned to this rater (in this example there is only one test)
Choice of standards that have to be set for this test
The standard setting form
Clusters that have been defined on this test
Browse through the items in the different clusters

The rater should logout if he/she leaves the computer. Ratings are always saved immediately, so logging out or accidentally closing the browser does not present a problem.

Standards set by this rater for each cluster. Standards set in round 1 are given a black color, standards set in round 2 are red.

Test score scale
Preview of the item. The previewer supports items in picture, html or QTI format.
Group leader interface

After login, group leaders are redirected to an overview page, where they can see the standards set by all the raters and manage the standard setting session by collecting and distributing the forms. Only forms and rounds that are distributed can be edited by the raters. Once a form is collected, it can be re-distributed so that the raters can edit it again. There is one restriction though, once a form for round 2 is distributed, it becomes impossible to re-distribute the form for round 1 of that same standard. The standards can be exported to an excel file from the page or read from the underlying sqlite database from R.

Choice of tests assigned to this rater (in this example there is only one test)

The raters and the standards they have set

Some general statistics on rater agreement

The group leader has the same options for browsing through the test items as the raters

Options for the group leader. The 3DC program offers some helpful graphics. The ratings table can also be downloaded in excel format.

With these buttons the group leader can control which standard setting forms are open to the raters. When the group leader first logs in, all forms are closed. Just like with paper forms, these computer forms can be distributed, collected and re-distributed if necessary. Once a form for round 2 is distributed, it is no longer possible to re-distribute the form for round 1. As a group leader you should therefore carefully check if everyone has filled in all scores in round 1 before you distribute the form for round 2.
References
