Using ARQ to make SPARQL queries

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Contents

SPARQL scripts for the demographics cube (DC-DEMO-sample.ttl)

The examples below uses `arq` from Apache Jena (http://jena.apache.org). To install arq - download and unpack the latest version of apache-jena from (http://jena.apache.org/download/index.cgi). Then you need some way of invoking `arq`; I use a not-so-clever-approach: `cd ~/bin; ln -s /opt/apache-jena-2.13.0/bin/arq`.

Given a SPARQL query and RDF data, `arq` returns the result of the query. So this is the command line way of making a SPARQL query.

The use of arq is described many places, see for example (http://www.learningsparql.com/).

All `arq` commands below are to be run in the directory with the sample files, which is `inst/extdata/sample-rdf` directory or `extdata/sample-rdf` depending on the whether the development version or the installed version of the package is used.

The cd below in each code block is included because I could not find a quick way to get the code chunk executed in that directory. knitr is flexible enough to do it, I have not yet found the right way to do it. So, ignore the repeated cd ..

Get dimensions

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOdimensions.rq
```

```
## ---------------------------
## | p                       |
## ===========================
## | crnd-dimension:ethnic    |
## | crnd-dimension:race      |
## | crnd-dimension:procedure |
## | crnd-dimension:agegr1    |
## | crnd-dimension:factor    |
## | crnd-dimension:trt01a    |
## | crnd-dimension:sex       |
## ---------------------------
```

Get attributes

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOattributes.rq
```

```
## -----------------------------
## | p                         |
## =============================
## | crnd-attribute:cellpartno  |
## | crnd-attribute:measurefmt  |
## | crnd-attribute:colno       |
## | crnd-attribute:denominator |
## | crnd-attribute:unit        |
## | crnd-attribute:rowno       |
## -----------------------------
```

Get observations

The SPARQL script shows for each observation the dimension, attributes and measures in a row. Note: in the HTML version the output below can be scrolled using the left and right arrow.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOobservations.rq
```

```
## --------------------------------------------------------------------------------------------------
## | s          | ethnic            | race                                      | proc
## ==================================================================================================
## | ds:obs103 | code:ethnic-_ALL_ | code:race-_ALL_                           | code
## | ds:obs014 | code:ethnic-_ALL_ | code:race-_ALL_                           | code
## | ds:obs089 | code:ethnic-_ALL_ | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE | code
## | ds:obs019 | code:ethnic-_ALL_ | code:race-_ALL_                           | code
## | ds:obs031 | code:ethnic-_ALL_ | code:race-_ALL_                           | code
## | ds:obs013 | code:ethnic-_ALL_ | code:race-_ALL_                           | code
```

```
## | ds:obs124 | code:ethnic-NOT_HISPANIC_OR_LATINO | code:race-_ALL_                          | code
## | ds:obs084 | code:ethnic-_ALL_                   | code:race-BLACK_OR_AFRICAN_AMERICAN         | code
## | ds:obs129 | code:ethnic-HISPANIC_OR_LATINO      | code:race-_ALL_                          | code
## | ds:obs088 | code:ethnic-_ALL_                   | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE | code
## | ds:obs041 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs123 | code:ethnic-NOT_HISPANIC_OR_LATINO | code:race-_ALL_                          | code
## | ds:obs094 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs098 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs048 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs093 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs097 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs021 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs058 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs132 | code:ethnic-HISPANIC_OR_LATINO      | code:race-_ALL_                          | code
## | ds:obs027 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs020 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs056 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs130 | code:ethnic-HISPANIC_OR_LATINO      | code:race-_ALL_                          | code
## | ds:obs051 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs007 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs055 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs076 | code:ethnic-_ALL_                   | code:race-WHITE                          | code
## | ds:obs117 | code:ethnic-_NONMISS_               | code:race-_ALL_                          | code
## | ds:obs072 | code:ethnic-_ALL_                   | code:race-_NONMISS_                      | code
## | ds:obs001 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs026 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs006 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs106 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs061 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs065 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs111 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs071 | code:ethnic-_ALL_                   | code:race-_NONMISS_                      | code
## | ds:obs116 | code:ethnic-_NONMISS_               | code:race-_ALL_                          | code
## | ds:obs075 | code:ethnic-_ALL_                   | code:race-WHITE                          | code
## | ds:obs100 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs105 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs060 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs016 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs064 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs036 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs110 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs126 | code:ethnic-NOT_HISPANIC_OR_LATINO | code:race-_ALL_                          | code
## | ds:obs081 | code:ethnic-_ALL_                   | code:race-BLACK_OR_AFRICAN_AMERICAN         | code
## | ds:obs010 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs085 | code:ethnic-_ALL_                   | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE | code
## | ds:obs035 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs120 | code:ethnic-_NONMISS_               | code:race-_ALL_                          | code
## | ds:obs080 | code:ethnic-_ALL_                   | code:race-BLACK_OR_AFRICAN_AMERICAN         | code
## | ds:obs033 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs090 | code:ethnic-_ALL_                   | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE | code
## | ds:obs015 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs043 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
## | ds:obs125 | code:ethnic-NOT_HISPANIC_OR_LATINO | code:race-_ALL_                          | code
## | ds:obs042 | code:ethnic-_ALL_                   | code:race-_ALL_                          | code
```

```
## | ds:obs095 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs099 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs052 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs029 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs023 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs059 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs028 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs022 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs009 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs057 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs038 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs003 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs119 | code:ethnic-_NONMISS_             | code:race-_ALL_                             | code
## | ds:obs078 | code:ethnic-_ALL_                 | code:race-WHITE                             | code
## | ds:obs008 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs108 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs118 | code:ethnic-_NONMISS_             | code:race-_ALL_                             | code
## | ds:obs067 | code:ethnic-_ALL_                 | code:race-_NONMISS_                         | code
## | ds:obs018 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs113 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs073 | code:ethnic-_ALL_                 | code:race-WHITE                             | code
## | ds:obs002 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs102 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs077 | code:ethnic-_ALL_                 | code:race-WHITE                             | code
## | ds:obs107 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs062 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs030 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs066 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs112 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs128 | code:ethnic-HISPANIC_OR_LATINO    | code:race-_ALL_                             | code
## | ds:obs083 | code:ethnic-_ALL_                 | code:race-BLACK_OR_AFRICAN_AMERICAN         | code
## | ds:obs101 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs012 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs017 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs087 | code:ethnic-_ALL_                 | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE | code
## | ds:obs037 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs122 | code:ethnic-NOT_HISPANIC_OR_LATINO | code:race-_ALL_                            | code
## | ds:obs127 | code:ethnic-HISPANIC_OR_LATINO    | code:race-_ALL_                             | code
## | ds:obs011 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs082 | code:ethnic-_ALL_                 | code:race-BLACK_OR_AFRICAN_AMERICAN         | code
## | ds:obs086 | code:ethnic-_ALL_                 | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE | code
## | ds:obs047 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs121 | code:ethnic-NOT_HISPANIC_OR_LATINO | code:race-_ALL_                            | code
## | ds:obs092 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs096 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs046 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs045 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs131 | code:ethnic-HISPANIC_OR_LATINO    | code:race-_ALL_                             | code
## | ds:obs091 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs040 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs044 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs050 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs054 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
## | ds:obs005 | code:ethnic-_ALL_                 | code:race-_ALL_                             | code
```

```
## | ds:obs053 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs025 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs115 | code:ethnic-_NONMISS_  | code:race-_ALL_                      | code
## | ds:obs070 | code:ethnic-_ALL_      | code:race-_NONMISS_                  | code
## | ds:obs074 | code:ethnic-_ALL_      | code:race-WHITE                      | code
## | ds:obs104 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs024 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs063 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs034 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs039 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs069 | code:ethnic-_ALL_      | code:race-_NONMISS_                  | code
## | ds:obs004 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs079 | code:ethnic-_ALL_      | code:race-BLACK_OR_AFRICAN_AMERICAN  | code
## | ds:obs109 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs068 | code:ethnic-_ALL_      | code:race-_NONMISS_                  | code
## | ds:obs032 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs049 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## | ds:obs114 | code:ethnic-_ALL_      | code:race-_ALL_                      | code
## -------------------------------------------------------------------------------
```

Get definition for all descriptive statistics - class `code:procedure`

The SPARQL script shows how the R function definition for the descriptive statistics is stored in the cube.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOprocedure.rq
```

```
## --------------------------------------------------------------------------------
## | procedure            | prefLabel | functiondef
## ================================================================================
## | code:procedure-max     | "max"     | "function (x) {    max(x, na.rm = TRUE) }"
## | code:procedure-std     | "std"     | "function (x) {    sd(x, na.rm = TRUE) }"
## | code:procedure-mean    | "mean"    | "function (x) {    mean(x, na.rm = TRUE) }"
## | code:procedure-min     | "min"     | "function (x) {    min(x, na.rm = TRUE) }"
## | code:procedure-percent | "percent" | "function (x) {    -1 }"
## | code:procedure-count   | "count"   | "function (x) {    length(x) }"
## | code:procedure-q3      | "q3"      | "function (x) {    quantile(x, probs = c(0.75), na.rm = TRU
## | code:procedure-n       | "n"       | "function (x) {    length(x[!is.na(x)]) }"
## | code:procedure-median  | "median"  | "function (x) {    median(x, na.rm = TRUE) }"
## | code:procedure-q1      | "q1"      | "function (x) {    quantile(x, probs = c(0.25), na.rm = TRU
## --------------------------------------------------------------------------------
```

Get the codelists

The SPARQL script shows the codelist.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOcodelist.rq
```

```
## --------------------------------------------------------------------------------
## | codeList     | codelevel                                          | codelist     | prefLabel
```

```
## ===========================================================================================================
## | code:ethnic   | code:factor-quantity                                  | code:factor    | "quantity"
## | code:ethnic   | code:procedure-max                                    | code:procedure | "max"
## | code:ethnic   | code:procedure-q3                                     | code:procedure | "q3"
## | code:ethnic   | code:sex-F                                            | code:sex       | "F"
## | code:ethnic   | code:agegr1-_65                                       | code:agegr1    | "<65"
## | code:ethnic   | code:factor-proportion                                | code:factor    | "proportio
## | code:ethnic   | code:agegr1-_80                                       | code:agegr1    | ">80"
## | code:ethnic   | code:race-_ALL_                                       | code:race      | "_ALL_"
## | code:ethnic   | code:procedure-mean                                   | code:procedure | "mean"
## | code:ethnic   | code:trt01a-_ALL_                                     | code:trt01a    | "_ALL_"
## | code:ethnic   | code:sex-M                                            | code:sex       | "M"
## | code:ethnic   | code:ethnic-HISPANIC_OR_LATINO                        | code:ethnic    | "HISPANIC (
## | code:ethnic   | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER   | code:race      | "NATIVE HAW
## | code:ethnic   | code:ethnic-NOT_HISPANIC_OR_LATINO                    | code:ethnic    | "NOT HISPAN
## | code:ethnic   | code:procedure-median                                 | code:procedure | "median"
## | code:ethnic   | code:ethnic-_NONMISS_                                 | code:ethnic    | "_NONMISS_
## | code:ethnic   | code:procedure-q1                                     | code:procedure | "q1"
## | code:ethnic   | code:trt01a-Xanomeline_High_Dose                      | code:trt01a    | "Xanomeline
## | code:ethnic   | code:agegr1-_ALL_                                     | code:agegr1    | "_ALL_"
## | code:ethnic   | code:sex-UN                                           | code:sex       | "UN"
## | code:ethnic   | code:sex-_ALL_                                        | code:sex       | "_ALL_"
## | code:ethnic   | code:race-ASIAN                                       | code:race      | "ASIAN"
## | code:ethnic   | code:race-WHITE                                       | code:race      | "WHITE"
## | code:ethnic   | code:trt01a-_NONMISS_                                 | code:trt01a    | "_NONMISS_
## | code:ethnic   | code:sex-_NONMISS_                                    | code:sex       | "_NONMISS_
## | code:ethnic   | code:factor-age                                       | code:factor    | "age"
## | code:ethnic   | code:ethnic-_ALL_                                     | code:ethnic    | "_ALL_"
## | code:ethnic   | code:procedure-n                                     | code:procedure | "n"
## | code:ethnic   | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE            | code:race      | "AMERICAN I
## | code:ethnic   | code:trt01a-Placebo                                   | code:trt01a    | "Placebo"
## | code:ethnic   | code:factor-weightbl                                  | code:factor    | "weightbl"
## | code:ethnic   | code:trt01a-Xanomeline_Low_Dose                       | code:trt01a    | "Xanomeline
## | code:ethnic   | code:factor-_ALL_                                     | code:factor    | "_ALL_"
## | code:ethnic   | code:procedure-percent                                | code:procedure | "percent"
## | code:ethnic   | code:agegr1-65-80                                     | code:agegr1    | "65-80"
## | code:ethnic   | code:procedure-min                                    | code:procedure | "min"
## | code:ethnic   | code:race-_NONMISS_                                   | code:race      | "_NONMISS_
## | code:ethnic   | code:agegr1-_NONMISS_                                 | code:agegr1    | "_NONMISS_
## | code:ethnic   | code:race-BLACK_OR_AFRICAN_AMERICAN                   | code:race      | "BLACK OR A
## | code:ethnic   | code:factor-_NONMISS_                                 | code:factor    | "_NONMISS_
## | code:ethnic   | code:sex-U                                            | code:sex       | "U"
## | code:ethnic   | code:procedure-count                                  | code:procedure | "count"
## | code:ethnic   | code:procedure-std                                    | code:procedure | "std"
## | code:agegr1   | code:factor-quantity                                  | code:factor    | "quantity"
## | code:agegr1   | code:procedure-max                                    | code:procedure | "max"
## | code:agegr1   | code:procedure-q3                                     | code:procedure | "q3"
## | code:agegr1   | code:sex-F                                            | code:sex       | "F"
## | code:agegr1   | code:agegr1-_65                                       | code:agegr1    | "<65"
## | code:agegr1   | code:factor-proportion                                | code:factor    | "proportio
## | code:agegr1   | code:agegr1-_80                                       | code:agegr1    | ">80"
## | code:agegr1   | code:race-_ALL_                                       | code:race      | "_ALL_"
## | code:agegr1   | code:procedure-mean                                   | code:procedure | "mean"
## | code:agegr1   | code:trt01a-_ALL_                                     | code:trt01a    | "_ALL_"
```

```
## | code:agegr1    | code:sex-M                                             | code:sex       | "M"
## | code:agegr1    | code:ethnic-HISPANIC_OR_LATINO                         | code:ethnic    | "HISPANIC (
## | code:agegr1    | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER | code:race      | "NATIVE HAW
## | code:agegr1    | code:ethnic-NOT_HISPANIC_OR_LATINO                     | code:ethnic    | "NOT HISPAN
## | code:agegr1    | code:procedure-median                                  | code:procedure | "median"
## | code:agegr1    | code:ethnic-_NONMISS_                                   | code:ethnic    | "_NONMISS_
## | code:agegr1    | code:procedure-q1                                      | code:procedure | "q1"
## | code:agegr1    | code:trt01a-Xanomeline_High_Dose                       | code:trt01a    | "Xanomeline
## | code:agegr1    | code:agegr1-_ALL_                                      | code:agegr1    | "_ALL_"
## | code:agegr1    | code:sex-UN                                            | code:sex       | "UN"
## | code:agegr1    | code:sex-_ALL_                                         | code:sex       | "_ALL_"
## | code:agegr1    | code:race-ASIAN                                        | code:race      | "ASIAN"
## | code:agegr1    | code:race-WHITE                                        | code:race      | "WHITE"
## | code:agegr1    | code:trt01a-_NONMISS_                                  | code:trt01a    | "_NONMISS_
## | code:agegr1    | code:sex-_NONMISS_                                     | code:sex       | "_NONMISS_
## | code:agegr1    | code:factor-age                                        | code:factor    | "age"
## | code:agegr1    | code:ethnic-_ALL_                                      | code:ethnic    | "_ALL_"
## | code:agegr1    | code:procedure-n                                       | code:procedure | "n"
## | code:agegr1    | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE             | code:race      | "AMERICAN I
## | code:agegr1    | code:trt01a-Placebo                                    | code:trt01a    | "Placebo"
## | code:agegr1    | code:factor-weightbl                                   | code:factor    | "weightbl"
## | code:agegr1    | code:trt01a-Xanomeline_Low_Dose                        | code:trt01a    | "Xanomeline
## | code:agegr1    | code:factor-_ALL_                                      | code:factor    | "_ALL_"
## | code:agegr1    | code:procedure-percent                                 | code:procedure | "percent"
## | code:agegr1    | code:agegr1-65-80                                      | code:agegr1    | "65-80"
## | code:agegr1    | code:procedure-min                                     | code:procedure | "min"
## | code:agegr1    | code:race-_NONMISS_                                    | code:race      | "_NONMISS_
## | code:agegr1    | code:agegr1-_NONMISS_                                  | code:agegr1    | "_NONMISS_
## | code:agegr1    | code:race-BLACK_OR_AFRICAN_AMERICAN                    | code:race      | "BLACK OR A
## | code:agegr1    | code:factor-_NONMISS_                                  | code:factor    | "_NONMISS_
## | code:agegr1    | code:sex-U                                             | code:sex       | "U"
## | code:agegr1    | code:procedure-count                                   | code:procedure | "count"
## | code:agegr1    | code:procedure-std                                     | code:procedure | "std"
## | code:procedure | code:factor-quantity                                   | code:factor    | "quantity"
## | code:procedure | code:procedure-max                                     | code:procedure | "max"
## | code:procedure | code:procedure-q3                                      | code:procedure | "q3"
## | code:procedure | code:sex-F                                             | code:sex       | "F"
## | code:procedure | code:agegr1-_65                                        | code:agegr1    | "<65"
## | code:procedure | code:factor-proportion                                 | code:factor    | "proportion
## | code:procedure | code:agegr1-_80                                        | code:agegr1    | ">80"
## | code:procedure | code:race-_ALL_                                        | code:race      | "_ALL_"
## | code:procedure | code:procedure-mean                                    | code:procedure | "mean"
## | code:procedure | code:trt01a-_ALL_                                      | code:trt01a    | "_ALL_"
## | code:procedure | code:sex-M                                             | code:sex       | "M"
## | code:procedure | code:ethnic-HISPANIC_OR_LATINO                         | code:ethnic    | "HISPANIC (
## | code:procedure | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER | code:race      | "NATIVE HAW
## | code:procedure | code:ethnic-NOT_HISPANIC_OR_LATINO                     | code:ethnic    | "NOT HISPAN
## | code:procedure | code:procedure-median                                  | code:procedure | "median"
## | code:procedure | code:ethnic-_NONMISS_                                   | code:ethnic    | "_NONMISS_
## | code:procedure | code:procedure-q1                                      | code:procedure | "q1"
## | code:procedure | code:trt01a-Xanomeline_High_Dose                       | code:trt01a    | "Xanomeline
## | code:procedure | code:agegr1-_ALL_                                      | code:agegr1    | "_ALL_"
## | code:procedure | code:sex-UN                                            | code:sex       | "UN"
## | code:procedure | code:sex-_ALL_                                         | code:sex       | "_ALL_"
```

```
## | code:procedure | code:race-ASIAN                                         | code:race      | "ASIAN"
## | code:procedure | code:race-WHITE                                         | code:race      | "WHITE"
## | code:procedure | code:trt01a-_NONMISS_                                    | code:trt01a    | "_NONMISS_
## | code:procedure | code:sex-_NONMISS_                                      | code:sex       | "_NONMISS_
## | code:procedure | code:factor-age                                         | code:factor    | "age"
## | code:procedure | code:ethnic-_ALL_                                       | code:ethnic    | "_ALL_"
## | code:procedure | code:procedure-n                                        | code:procedure | "n"
## | code:procedure | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE              | code:race      | "AMERICAN
## | code:procedure | code:trt01a-Placebo                                     | code:trt01a    | "Placebo"
## | code:procedure | code:factor-weightbl                                    | code:factor    | "weightbl"
## | code:procedure | code:trt01a-Xanomeline_Low_Dose                         | code:trt01a    | "Xanomeline
## | code:procedure | code:factor-_ALL_                                       | code:factor    | "_ALL_"
## | code:procedure | code:procedure-percent                                  | code:procedure | "percent"
## | code:procedure | code:agegr1-65-80                                       | code:agegr1    | "65-80"
## | code:procedure | code:procedure-min                                      | code:procedure | "min"
## | code:procedure | code:race-_NONMISS_                                     | code:race      | "_NONMISS_
## | code:procedure | code:agegr1-_NONMISS_                                   | code:agegr1    | "_NONMISS_
## | code:procedure | code:race-BLACK_OR_AFRICAN_AMERICAN                     | code:race      | "BLACK OR A
## | code:procedure | code:factor-_NONMISS_                                   | code:factor    | "_NONMISS_
## | code:procedure | code:sex-U                                              | code:sex       | "U"
## | code:procedure | code:procedure-count                                    | code:procedure | "count"
## | code:procedure | code:procedure-std                                      | code:procedure | "std"
## | code:factor    | code:factor-quantity                                    | code:factor    | "quantity"
## | code:factor    | code:procedure-max                                      | code:procedure | "max"
## | code:factor    | code:procedure-q3                                       | code:procedure | "q3"
## | code:factor    | code:sex-F                                              | code:sex       | "F"
## | code:factor    | code:agegr1-_65                                         | code:agegr1    | "<65"
## | code:factor    | code:factor-proportion                                  | code:factor    | "proportion
## | code:factor    | code:agegr1-_80                                         | code:agegr1    | ">80"
## | code:factor    | code:race-_ALL_                                         | code:race      | "_ALL_"
## | code:factor    | code:procedure-mean                                     | code:procedure | "mean"
## | code:factor    | code:trt01a-_ALL_                                       | code:trt01a    | "_ALL_"
## | code:factor    | code:sex-M                                              | code:sex       | "M"
## | code:factor    | code:ethnic-HISPANIC_OR_LATINO                          | code:ethnic    | "HISPANIC (
## | code:factor    | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER     | code:race      | "NATIVE HAW
## | code:factor    | code:ethnic-NOT_HISPANIC_OR_LATINO                      | code:ethnic    | "NOT HISPAN
## | code:factor    | code:procedure-median                                   | code:procedure | "median"
## | code:factor    | code:ethnic-_NONMISS_                                   | code:ethnic    | "_NONMISS_
## | code:factor    | code:procedure-q1                                       | code:procedure | "q1"
## | code:factor    | code:trt01a-Xanomeline_High_Dose                        | code:trt01a    | "Xanomeline
## | code:factor    | code:agegr1-_ALL_                                       | code:agegr1    | "_ALL_"
## | code:factor    | code:sex-UN                                             | code:sex       | "UN"
## | code:factor    | code:sex-_ALL_                                          | code:sex       | "_ALL_"
## | code:factor    | code:race-ASIAN                                         | code:race      | "ASIAN"
## | code:factor    | code:race-WHITE                                         | code:race      | "WHITE"
## | code:factor    | code:trt01a-_NONMISS_                                    | code:trt01a    | "_NONMISS_
## | code:factor    | code:sex-_NONMISS_                                      | code:sex       | "_NONMISS_
## | code:factor    | code:factor-age                                         | code:factor    | "age"
## | code:factor    | code:ethnic-_ALL_                                       | code:ethnic    | "_ALL_"
## | code:factor    | code:procedure-n                                        | code:procedure | "n"
## | code:factor    | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE              | code:race      | "AMERICAN
## | code:factor    | code:trt01a-Placebo                                     | code:trt01a    | "Placebo"
## | code:factor    | code:factor-weightbl                                    | code:factor    | "weightbl"
## | code:factor    | code:trt01a-Xanomeline_Low_Dose                         | code:trt01a    | "Xanomeline
```

```
## | code:factor    | code:factor-_ALL_                                         | code:factor    | "_ALL_"
## | code:factor    | code:procedure-percent                                    | code:procedure | "percent"
## | code:factor    | code:agegr1-65-80                                         | code:agegr1    | "65-80"
## | code:factor    | code:procedure-min                                        | code:procedure | "min"
## | code:factor    | code:race-_NONMISS_                                       | code:race      | "_NONMISS_
## | code:factor    | code:agegr1-_NONMISS_                                     | code:agegr1    | "_NONMISS_
## | code:factor    | code:race-BLACK_OR_AFRICAN_AMERICAN                       | code:race      | "BLACK OR A
## | code:factor    | code:factor-_NONMISS_                                     | code:factor    | "_NONMISS_
## | code:factor    | code:sex-U                                                | code:sex       | "U"
## | code:factor    | code:procedure-count                                      | code:procedure | "count"
## | code:factor    | code:procedure-std                                        | code:procedure | "std"
## | code:trt01a    | code:factor-quantity                                      | code:factor    | "quantity"
## | code:trt01a    | code:procedure-max                                        | code:procedure | "max"
## | code:trt01a    | code:procedure-q3                                         | code:procedure | "q3"
## | code:trt01a    | code:sex-F                                                | code:sex       | "F"
## | code:trt01a    | code:agegr1-_65                                           | code:agegr1    | "<65"
## | code:trt01a    | code:factor-proportion                                    | code:factor    | "proportion
## | code:trt01a    | code:agegr1-_80                                           | code:agegr1    | ">80"
## | code:trt01a    | code:race-_ALL_                                           | code:race      | "_ALL_"
## | code:trt01a    | code:procedure-mean                                       | code:procedure | "mean"
## | code:trt01a    | code:trt01a-_ALL_                                         | code:trt01a    | "_ALL_"
## | code:trt01a    | code:sex-M                                                | code:sex       | "M"
## | code:trt01a    | code:ethnic-HISPANIC_OR_LATINO                            | code:ethnic    | "HISPANIC O
## | code:trt01a    | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER       | code:race      | "NATIVE HAW
## | code:trt01a    | code:ethnic-NOT_HISPANIC_OR_LATINO                        | code:ethnic    | "NOT HISPAN
## | code:trt01a    | code:procedure-median                                     | code:procedure | "median"
## | code:trt01a    | code:ethnic-_NONMISS_                                     | code:ethnic    | "_NONMISS_
## | code:trt01a    | code:procedure-q1                                         | code:procedure | "q1"
## | code:trt01a    | code:trt01a-Xanomeline_High_Dose                          | code:trt01a    | "Xanomeline
## | code:trt01a    | code:agegr1-_ALL_                                         | code:agegr1    | "_ALL_"
## | code:trt01a    | code:sex-UN                                               | code:sex       | "UN"
## | code:trt01a    | code:sex-_ALL_                                            | code:sex       | "_ALL_"
## | code:trt01a    | code:race-ASIAN                                           | code:race      | "ASIAN"
## | code:trt01a    | code:race-WHITE                                           | code:race      | "WHITE"
## | code:trt01a    | code:trt01a-_NONMISS_                                     | code:trt01a    | "_NONMISS_
## | code:trt01a    | code:sex-_NONMISS_                                        | code:sex       | "_NONMISS_
## | code:trt01a    | code:factor-age                                           | code:factor    | "age"
## | code:trt01a    | code:ethnic-_ALL_                                         | code:ethnic    | "_ALL_"
## | code:trt01a    | code:procedure-n                                          | code:procedure | "n"
## | code:trt01a    | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE                | code:race      | "AMERICAN I
## | code:trt01a    | code:trt01a-Placebo                                       | code:trt01a    | "Placebo"
## | code:trt01a    | code:factor-weightbl                                      | code:factor    | "weightbl"
## | code:trt01a    | code:trt01a-Xanomeline_Low_Dose                           | code:trt01a    | "Xanomeline
## | code:trt01a    | code:factor-_ALL_                                         | code:factor    | "_ALL_"
## | code:trt01a    | code:procedure-percent                                    | code:procedure | "percent"
## | code:trt01a    | code:agegr1-65-80                                         | code:agegr1    | "65-80"
## | code:trt01a    | code:procedure-min                                        | code:procedure | "min"
## | code:trt01a    | code:race-_NONMISS_                                       | code:race      | "_NONMISS_
## | code:trt01a    | code:agegr1-_NONMISS_                                     | code:agegr1    | "_NONMISS_
## | code:trt01a    | code:race-BLACK_OR_AFRICAN_AMERICAN                       | code:race      | "BLACK OR A
## | code:trt01a    | code:factor-_NONMISS_                                     | code:factor    | "_NONMISS_
## | code:trt01a    | code:sex-U                                                | code:sex       | "U"
## | code:trt01a    | code:procedure-count                                      | code:procedure | "count"
## | code:trt01a    | code:procedure-std                                        | code:procedure | "std"
```

```
## | code:sex    | code:factor-quantity                                      | code:factor    | "quantity"
## | code:sex    | code:procedure-max                                        | code:procedure | "max"
## | code:sex    | code:procedure-q3                                         | code:procedure | "q3"
## | code:sex    | code:sex-F                                                | code:sex       | "F"
## | code:sex    | code:agegr1-_65                                           | code:agegr1    | "<65"
## | code:sex    | code:factor-proportion                                    | code:factor    | "proportio
## | code:sex    | code:agegr1-_80                                           | code:agegr1    | ">80"
## | code:sex    | code:race-_ALL_                                           | code:race      | "_ALL_"
## | code:sex    | code:procedure-mean                                       | code:procedure | "mean"
## | code:sex    | code:trt01a-_ALL_                                         | code:trt01a    | "_ALL_"
## | code:sex    | code:sex-M                                                | code:sex       | "M"
## | code:sex    | code:ethnic-HISPANIC_OR_LATINO                            | code:ethnic    | "HISPANIC
## | code:sex    | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER       | code:race      | "NATIVE HAW
## | code:sex    | code:ethnic-NOT_HISPANIC_OR_LATINO                        | code:ethnic    | "NOT HISPA
## | code:sex    | code:procedure-median                                     | code:procedure | "median"
## | code:sex    | code:ethnic-_NONMISS_                                     | code:ethnic    | "_NONMISS_
## | code:sex    | code:procedure-q1                                         | code:procedure | "q1"
## | code:sex    | code:trt01a-Xanomeline_High_Dose                          | code:trt01a    | "Xanomelin
## | code:sex    | code:agegr1-_ALL_                                         | code:agegr1    | "_ALL_"
## | code:sex    | code:sex-UN                                               | code:sex       | "UN"
## | code:sex    | code:sex-_ALL_                                            | code:sex       | "_ALL_"
## | code:sex    | code:race-ASIAN                                           | code:race      | "ASIAN"
## | code:sex    | code:race-WHITE                                           | code:race      | "WHITE"
## | code:sex    | code:trt01a-_NONMISS_                                     | code:trt01a    | "_NONMISS_
## | code:sex    | code:sex-_NONMISS_                                        | code:sex       | "_NONMISS_
## | code:sex    | code:factor-age                                           | code:factor    | "age"
## | code:sex    | code:ethnic-_ALL_                                         | code:ethnic    | "_ALL_"
## | code:sex    | code:procedure-n                                          | code:procedure | "n"
## | code:sex    | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE                | code:race      | "AMERICAN
## | code:sex    | code:trt01a-Placebo                                       | code:trt01a    | "Placebo"
## | code:sex    | code:factor-weightbl                                      | code:factor    | "weightbl"
## | code:sex    | code:trt01a-Xanomeline_Low_Dose                           | code:trt01a    | "Xanomelin
## | code:sex    | code:factor-_ALL_                                         | code:factor    | "_ALL_"
## | code:sex    | code:procedure-percent                                    | code:procedure | "percent"
## | code:sex    | code:agegr1-65-80                                         | code:agegr1    | "65-80"
## | code:sex    | code:procedure-min                                        | code:procedure | "min"
## | code:sex    | code:race-_NONMISS_                                       | code:race      | "_NONMISS_
## | code:sex    | code:agegr1-_NONMISS_                                     | code:agegr1    | "_NONMISS_
## | code:sex    | code:race-BLACK_OR_AFRICAN_AMERICAN                       | code:race      | "BLACK OR A
## | code:sex    | code:factor-_NONMISS_                                     | code:factor    | "_NONMISS_
## | code:sex    | code:sex-U                                                | code:sex       | "U"
## | code:sex    | code:procedure-count                                      | code:procedure | "count"
## | code:sex    | code:procedure-std                                        | code:procedure | "std"
## | code:race   | code:factor-quantity                                      | code:factor    | "quantity"
## | code:race   | code:procedure-max                                        | code:procedure | "max"
## | code:race   | code:procedure-q3                                         | code:procedure | "q3"
## | code:race   | code:sex-F                                                | code:sex       | "F"
## | code:race   | code:agegr1-_65                                           | code:agegr1    | "<65"
## | code:race   | code:factor-proportion                                    | code:factor    | "proportio
## | code:race   | code:agegr1-_80                                           | code:agegr1    | ">80"
## | code:race   | code:race-_ALL_                                           | code:race      | "_ALL_"
## | code:race   | code:procedure-mean                                       | code:procedure | "mean"
## | code:race   | code:trt01a-_ALL_                                         | code:trt01a    | "_ALL_"
## | code:race   | code:sex-M                                                | code:sex       | "M"
```

```
## | code:race     | code:ethnic-HISPANIC_OR_LATINO                            | code:ethnic    | "HISPANIC (
## | code:race     | code:race-NATIVE_HAWAIIAN_OR_OTHER_PACIFIC_ISLANDER       | code:race      | "NATIVE HAW
## | code:race     | code:ethnic-NOT_HISPANIC_OR_LATINO                        | code:ethnic    | "NOT HISPAN
## | code:race     | code:procedure-median                                     | code:procedure | "median"
## | code:race     | code:ethnic-_NONMISS_                                      | code:ethnic    | "_NONMISS_
## | code:race     | code:procedure-q1                                         | code:procedure | "q1"
## | code:race     | code:trt01a-Xanomeline_High_Dose                          | code:trt01a    | "Xanomeline
## | code:race     | code:agegr1-_ALL_                                         | code:agegr1    | "_ALL_"
## | code:race     | code:sex-UN                                               | code:sex       | "UN"
## | code:race     | code:sex-_ALL_                                            | code:sex       | "_ALL_"
## | code:race     | code:race-ASIAN                                           | code:race      | "ASIAN"
## | code:race     | code:race-WHITE                                           | code:race      | "WHITE"
## | code:race     | code:trt01a-_NONMISS_                                     | code:trt01a    | "_NONMISS_
## | code:race     | code:sex-_NONMISS_                                        | code:sex       | "_NONMISS_
## | code:race     | code:factor-age                                          | code:factor    | "age"
## | code:race     | code:ethnic-_ALL_                                         | code:ethnic    | "_ALL_"
## | code:race     | code:procedure-n                                         | code:procedure | "n"
## | code:race     | code:race-AMERICAN_INDIAN_OR_ALASKA_NATIVE                | code:race      | "AMERICAN I
## | code:race     | code:trt01a-Placebo                                      | code:trt01a    | "Placebo"
## | code:race     | code:factor-weightbl                                     | code:factor    | "weightbl"
## | code:race     | code:trt01a-Xanomeline_Low_Dose                          | code:trt01a    | "Xanomeline
## | code:race     | code:factor-_ALL_                                        | code:factor    | "_ALL_"
## | code:race     | code:procedure-percent                                   | code:procedure | "percent"
## | code:race     | code:agegr1-65-80                                        | code:agegr1    | "65-80"
## | code:race     | code:procedure-min                                       | code:procedure | "min"
## | code:race     | code:race-_NONMISS_                                       | code:race      | "_NONMISS_
## | code:race     | code:agegr1-_NONMISS_                                     | code:agegr1    | "_NONMISS_
## | code:race     | code:race-BLACK_OR_AFRICAN_AMERICAN                       | code:race      | "BLACK OR A
## | code:race     | code:factor-_NONMISS_                                     | code:factor    | "_NONMISS_
## | code:race     | code:sex-U                                               | code:sex       | "U"
## | code:race     | code:procedure-count                                     | code:procedure | "count"
## | code:race     | code:procedure-std                                       | code:procedure | "std"
## --------------------------------------------------------------------------------------------
```

Get the codelist definition for all descriptive statistics - class `code:procedure`

The SPARQL script shows how the R function definition for the descriptive statistics is stored in the cube.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOprocedure-codelist.rq
```

```
## --------------------------------------------------------------------------------------------
## | s                    | p                                | o
## ===========================================================================================
## | code:procedure-min   | skos:topConceptOf                | code:procedure
## | code:procedure-min   | skos:prefLabel                   | "min"
## | code:procedure-min   | skos:inScheme                    | code:procedure
## | code:procedure-min   | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {     min(x, na.rm = TRU
## | code:procedure-min   | rrdfqbcrnd0:R-selectionvalue     | "min"
## | code:procedure-min   | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-min   | rdfs:comment                     | "Descriptive statistics min"@en
## | code:procedure-min   | rdf:type                         | skos:Concept
## | code:procedure-min   | rdf:type                         | code:Procedure
```

```
## | code:procedure-std    | skos:topConceptOf                | code:procedure
## | code:procedure-std    | skos:prefLabel                   | "std"
## | code:procedure-std    | skos:inScheme                    | code:procedure
## | code:procedure-std    | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {      sd(x, na.rm = TRUE)
## | code:procedure-std    | rrdfqbcrnd0:R-selectionvalue     | "std"
## | code:procedure-std    | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-std    | rdfs:comment                     | "Descriptive statistics std"@en
## | code:procedure-std    | rdf:type                         | skos:Concept
## | code:procedure-std    | rdf:type                         | code:Procedure
## | code:procedure-q3     | skos:topConceptOf                | code:procedure
## | code:procedure-q3     | skos:prefLabel                   | "q3"
## | code:procedure-q3     | skos:inScheme                    | code:procedure
## | code:procedure-q3     | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {      quantile(x, probs =
## | code:procedure-q3     | rrdfqbcrnd0:R-selectionvalue     | "q3"
## | code:procedure-q3     | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-q3     | rdfs:comment                     | "Descriptive statistics q3"@en
## | code:procedure-q3     | rdf:type                         | skos:Concept
## | code:procedure-q3     | rdf:type                         | code:Procedure
## | code:procedure-median | skos:topConceptOf                | code:procedure
## | code:procedure-median | skos:prefLabel                   | "median"
## | code:procedure-median | skos:inScheme                    | code:procedure
## | code:procedure-median | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {      median(x, na.rm = T
## | code:procedure-median | rrdfqbcrnd0:R-selectionvalue     | "median"
## | code:procedure-median | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-median | rdfs:comment                     | "Descriptive statistics median"@en
## | code:procedure-median | rdf:type                         | skos:Concept
## | code:procedure-median | rdf:type                         | code:Procedure
## | code:procedure-count  | skos:topConceptOf                | code:procedure
## | code:procedure-count  | skos:prefLabel                   | "count"
## | code:procedure-count  | skos:inScheme                    | code:procedure
## | code:procedure-count  | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {      length(x) }"
## | code:procedure-count  | rrdfqbcrnd0:R-selectionvalue     | "count"
## | code:procedure-count  | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-count  | rdfs:comment                     | "Descriptive statistics count"@en
## | code:procedure-count  | rdf:type                         | skos:Concept
## | code:procedure-count  | rdf:type                         | code:Procedure
## | code:procedure-max    | skos:topConceptOf                | code:procedure
## | code:procedure-max    | skos:prefLabel                   | "max"
## | code:procedure-max    | skos:inScheme                    | code:procedure
## | code:procedure-max    | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {      max(x, na.rm = TRUE
## | code:procedure-max    | rrdfqbcrnd0:R-selectionvalue     | "max"
## | code:procedure-max    | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-max    | rdfs:comment                     | "Descriptive statistics max"@en
## | code:procedure-max    | rdf:type                         | skos:Concept
## | code:procedure-max    | rdf:type                         | code:Procedure
## | code:procedure-mean   | skos:topConceptOf                | code:procedure
## | code:procedure-mean   | skos:prefLabel                   | "mean"
## | code:procedure-mean   | skos:inScheme                    | code:procedure
## | code:procedure-mean   | rrdfqbcrnd0:RdescStatDefFun      | "function (x) {      mean(x, na.rm = TRU
## | code:procedure-mean   | rrdfqbcrnd0:R-selectionvalue     | "mean"
## | code:procedure-mean   | rrdfqbcrnd0:R-selectionoperator  | "=="
## | code:procedure-mean   | rdfs:comment                     | "Descriptive statistics mean"@en
## | code:procedure-mean   | rdf:type                         | skos:Concept
## | code:procedure-mean   | rdf:type                         | code:Procedure
```

```
## | code:procedure-q1      | skos:topConceptOf          | code:procedure
## | code:procedure-q1      | skos:prefLabel             | "q1"
## | code:procedure-q1      | skos:inScheme              | code:procedure
## | code:procedure-q1      | rrdfqbcrnd0:RdescStatDefFun  | "function (x) {      quantile(x, probs =
## | code:procedure-q1      | rrdfqbcrnd0:R-selectionvalue | "q1"
## | code:procedure-q1      | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:procedure-q1      | rdfs:comment               | "Descriptive statistics q1"@en
## | code:procedure-q1      | rdf:type                   | skos:Concept
## | code:procedure-q1      | rdf:type                   | code:Procedure
## | code:procedure-n       | skos:topConceptOf          | code:procedure
## | code:procedure-n       | skos:prefLabel             | "n"
## | code:procedure-n       | skos:inScheme              | code:procedure
## | code:procedure-n       | rrdfqbcrnd0:RdescStatDefFun  | "function (x) {      length(x[!is.na(x)]
## | code:procedure-n       | rrdfqbcrnd0:R-selectionvalue | "n"
## | code:procedure-n       | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:procedure-n       | rdfs:comment               | "Descriptive statistics n"@en
## | code:procedure-n       | rdf:type                   | skos:Concept
## | code:procedure-n       | rdf:type                   | code:Procedure
## | code:procedure-percent | skos:topConceptOf          | code:procedure
## | code:procedure-percent | skos:prefLabel             | "percent"
## | code:procedure-percent | skos:inScheme              | code:procedure
## | code:procedure-percent | rrdfqbcrnd0:RdescStatDefFun  | "function (x) {      -1 }"
## | code:procedure-percent | rrdfqbcrnd0:R-selectionvalue | "percent"
## | code:procedure-percent | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:procedure-percent | rdfs:comment               | "Descriptive statistics percent"@en
## | code:procedure-percent | rdf:type                   | skos:Concept
## | code:procedure-percent | rdf:type                   | code:Procedure
## ------------------------------------------------------------------------------
```

Get definition for all variables used for descriptive statistics - class `code:factor`

The SPARQL script shows how the R function definition for the descriptive statistics is stored in the cube.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOfactor.rq
```

```
## ------------------------------------------------------------------------------
## | factor                | prefLabel    | DataSetRefD2RQ          | Rselectionvalue |
## ==============================================================================
## | code:factor-_ALL_     | "_ALL_"      |                         |                 |
## | code:factor-proportion | "proportion" |                         | "proportion"    |
## | code:factor-weightbl  | "weightbl"   | rrdfqbcrnd0:ADSL_WEIGHTBL | "weightbl"      |
## | code:factor-_NONMISS_ | "_NONMISS_"  |                         |                 |
## | code:factor-quantity  | "quantity"   |                         | "quantity"      |
## | code:factor-age       | "age"        | rrdfqbcrnd0:ADSL_AGE    | "age"           |
## ------------------------------------------------------------------------------
```

Get the codelist definition for all variables used for descriptive statistics - class `code:factor`

The SPARQL script shows how the R function definition for the descriptive statistics is stored in the cube.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOfactor-codelist.rq
```

```
## ------------------------------------------------------------------------------
## | s                     | p                               | o
## ==============================================================================
## | code:factor-weightbl  | skos:topConceptOf               | code:factor
## | code:factor-weightbl  | skos:prefLabel                  | "weightbl"
## | code:factor-weightbl  | skos:inScheme                   | code:factor
## | code:factor-weightbl  | rrdfqbcrnd0:R-selectionvalue    | "weightbl"
## | code:factor-weightbl  | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:factor-weightbl  | rrdfqbcrnd0:DataSetRefD2RQ      | rrdfqbcrnd0:ADSL_WEIGHTBL
## | code:factor-weightbl  | rdfs:comment                    | "Coded values from data source. No recor
## | code:factor-weightbl  | rdf:type                        | skos:Concept
## | code:factor-weightbl  | rdf:type                        | code:Factor
## | code:factor-age       | skos:topConceptOf               | code:factor
## | code:factor-age       | skos:prefLabel                  | "age"
## | code:factor-age       | skos:inScheme                   | code:factor
## | code:factor-age       | rrdfqbcrnd0:R-selectionvalue    | "age"
## | code:factor-age       | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:factor-age       | rrdfqbcrnd0:DataSetRefD2RQ      | rrdfqbcrnd0:ADSL_AGE
## | code:factor-age       | rdfs:comment                    | "Coded values from data source. No recor
## | code:factor-age       | rdf:type                        | skos:Concept
## | code:factor-age       | rdf:type                        | code:Factor
## | code:factor-_ALL_     | skos:topConceptOf               | code:factor
## | code:factor-_ALL_     | skos:prefLabel                  | "_ALL_"
## | code:factor-_ALL_     | skos:inScheme                   | code:factor
## | code:factor-_ALL_     | rdfs:comment                    | "NON-CDISC: Represents all codelist cate
## | code:factor-_ALL_     | rdf:type                        | skos:Concept
## | code:factor-_ALL_     | rdf:type                        | code:Factor
## | code:factor-quantity  | skos:topConceptOf               | code:factor
## | code:factor-quantity  | skos:prefLabel                  | "quantity"
## | code:factor-quantity  | skos:inScheme                   | code:factor
## | code:factor-quantity  | rrdfqbcrnd0:R-selectionvalue    | "quantity"
## | code:factor-quantity  | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:factor-quantity  | rdfs:comment                    | "Coded values from data source. No recor
## | code:factor-quantity  | rdf:type                        | skos:Concept
## | code:factor-quantity  | rdf:type                        | code:Factor
## | code:factor-_NONMISS_ | skos:topConceptOf               | code:factor
## | code:factor-_NONMISS_ | skos:prefLabel                  | "_NONMISS_"
## | code:factor-_NONMISS_ | skos:inScheme                   | code:factor
## | code:factor-_NONMISS_ | rrdfqbcrnd0:R-selectionfunction | "is.na"
## | code:factor-_NONMISS_ | rdfs:comment                    | "NON-CDISC: Represents the non-missing
## | code:factor-_NONMISS_ | rdf:type                        | skos:Concept
## | code:factor-_NONMISS_ | rdf:type                        | code:Factor
## | code:factor-proportion | skos:topConceptOf              | code:factor
## | code:factor-proportion | skos:prefLabel                 | "proportion"
## | code:factor-proportion | skos:inScheme                  | code:factor
## | code:factor-proportion | rrdfqbcrnd0:R-selectionvalue   | "proportion"
## | code:factor-proportion | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:factor-proportion | rdfs:comment                   | "Coded values from data source. No recor
## | code:factor-proportion | rdf:type                       | skos:Concept
## | code:factor-proportion | rdf:type                       | code:Factor
```

```
## -----------------------------------------------------------------------------------
```

Get definition for descriptive statistics median

The SPARQL script shows how the function definition for the descriptive statistics is stored in the cube.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOprocedure-median.rq
```

```
## -----------------------------------------------------------------------------------
## | s                    | p                            | o
## ===================================================================================
## | code:procedure-median | skos:topConceptOf            | code:procedure
## | code:procedure-median | skos:prefLabel               | "median"
## | code:procedure-median | skos:inScheme                | code:procedure
## | code:procedure-median | rrdfqbcrnd0:RdescStatDefFun  | "function (x)  {      median(x, na.rm = T
## | code:procedure-median | rrdfqbcrnd0:R-selectionvalue | "median"
## | code:procedure-median | rrdfqbcrnd0:R-selectionoperator | "=="
## | code:procedure-median | rdfs:comment                 | "Descriptive statistics median"@en
## | code:procedure-median | rdf:type                     | skos:Concept
## | code:procedure-median | rdf:type                     | code:Procedure
## -----------------------------------------------------------------------------------
```

Get information for selection of data

The SPARQL script shows how the information for selecting data for derivation of univariate statistics is present in the cube.

```
cd ../extdata/sample-rdf
arq --data DC-DEMO-sample.ttl --query DEMOobservations-R-selection.rq
```

```
## -----------------------------------------------------------------------------------
## | obs       | rrdfqbcrnd0Rcolumnname | Rselectionoperator | Rselectionvalue      |
## ===================================================================================
## | ds:obs027 | "trt01a"               | "=="               | "Xanomeline High Dose" |
## | ds:obs056 | "agegr1"               | "=="               | "65-80"              |
## | ds:obs056 | "trt01a"               | "=="               | "Xanomeline Low Dose"  |
## -----------------------------------------------------------------------------------
```

Get information on the underlying data in D2RQ format

The following two SPARQL scripts are from taken from `create-ADSL-ttl.Rmd`.

First get the mapping information.

```
cd ../extdata/sample-rdf
arq --data adsl-map.ttl --query ADSL-mapping.rq
```

```
## -----------------------------------------------------------------
## | mapColumn                    | d2rqcolumn       | d2rqdatatype |
```

```
## =====================================================================
## | <adsl-map.ttl#ADSL_MMSETOT>  | "ADSL.MMSETOT"  | xsd:double  |
## | <adsl-map.ttl#ADSL_RACE>     | "ADSL.RACE"     |             |
## | <adsl-map.ttl#ADSL_DURDIS>   | "ADSL.DURDIS"   | xsd:double  |
## | <adsl-map.ttl#ADSL_TRTDUR>   | "ADSL.TRTDUR"   | xsd:double  |
## | <adsl-map.ttl#ADSL_HEIGHTBL> | "ADSL.HEIGHTBL" | xsd:double  |
## | <adsl-map.ttl#ADSL_DCREASCD> | "ADSL.DCREASCD" |             |
## | <adsl-map.ttl#ADSL_AGEGR1>   | "ADSL.AGEGR1"   |             |
## | <adsl-map.ttl#ADSL_RFENDTC>  | "ADSL.RFENDTC"  |             |
## | <adsl-map.ttl#ADSL_USUBJID>  | "ADSL.USUBJID"  |             |
## | <adsl-map.ttl#ADSL_AGEGR1N>  | "ADSL.AGEGR1N"  | xsd:double  |
## | <adsl-map.ttl#ADSL_TRT01A>   | "ADSL.TRT01A"   |             |
## | <adsl-map.ttl#ADSL_AGE>      | "ADSL.AGE"      | xsd:double  |
## | <adsl-map.ttl#ADSL_TRT01AN>  | "ADSL.TRT01AN"  | xsd:double  |
## | <adsl-map.ttl#ADSL_SITEGR1>  | "ADSL.SITEGR1"  |             |
## | <adsl-map.ttl#ADSL_DISCONFL> | "ADSL.DISCONFL" |             |
## | <adsl-map.ttl#ADSL_TRTEDT>   | "ADSL.TRTEDT"   | xsd:double  |
## | <adsl-map.ttl#ADSL_SUBJID>   | "ADSL.SUBJID"   |             |
## | <adsl-map.ttl#ADSL_SAFFL>    | "ADSL.SAFFL"    |             |
## | <adsl-map.ttl#ADSL_DURDSGR1> | "ADSL.DURDSGR1" |             |
## | <adsl-map.ttl#ADSL_EFFFL>    | "ADSL.EFFFL"    |             |
## | <adsl-map.ttl#ADSL_TRT01PN>  | "ADSL.TRT01PN"  | xsd:double  |
## | <adsl-map.ttl#ADSL_WEIGHTBL> | "ADSL.WEIGHTBL" | xsd:double  |
## | <adsl-map.ttl#ADSL_STUDYID>  | "ADSL.STUDYID"  |             |
## | <adsl-map.ttl#ADSL_AGEU>     | "ADSL.AGEU"     |             |
## | <adsl-map.ttl#ADSL_AVGDD>    | "ADSL.AVGDD"    | xsd:double  |
## | <adsl-map.ttl#ADSL_SEX>      | "ADSL.SEX"      |             |
## | <adsl-map.ttl#ADSL_ARM>      | "ADSL.ARM"      |             |
## | <adsl-map.ttl#ADSL_RFENDT>   | "ADSL.RFENDT"   | xsd:double  |
## | <adsl-map.ttl#ADSL_RACEN>    | "ADSL.RACEN"    | xsd:double  |
## | <adsl-map.ttl#ADSL_TRTSDT>   | "ADSL.TRTSDT"   | xsd:double  |
## | <adsl-map.ttl#ADSL_EDUCLVL>  | "ADSL.EDUCLVL"  | xsd:double  |
## | <adsl-map.ttl#ADSL_DSRAEFL>  | "ADSL.DSRAEFL"  |             |
## | <adsl-map.ttl#ADSL_COMP16FL> | "ADSL.COMP16FL" |             |
## | <adsl-map.ttl#ADSL_RFSTDTC>  | "ADSL.RFSTDTC"  |             |
## | <adsl-map.ttl#ADSL_BMIBLGR1> | "ADSL.BMIBLGR1" |             |
## | <adsl-map.ttl#ADSL_DTHFL>    | "ADSL.DTHFL"    |             |
## | <adsl-map.ttl#ADSL_BMIBL>    | "ADSL.BMIBL"    | xsd:double  |
## | <adsl-map.ttl#ADSL_COMP8FL>  | "ADSL.COMP8FL"  |             |
## | <adsl-map.ttl#ADSL_DISONSDT> | "ADSL.DISONSDT" | xsd:double  |
## | <adsl-map.ttl#ADSL_ITTFL>    | "ADSL.ITTFL"    |             |
## | <adsl-map.ttl#ADSL_TRT01P>   | "ADSL.TRT01P"   |             |
## | <adsl-map.ttl#ADSL_VISNUMEN> | "ADSL.VISNUMEN" | xsd:double  |
## | <adsl-map.ttl#ADSL_DCDECOD>  | "ADSL.DCDECOD"  |             |
## | <adsl-map.ttl#ADSL_VISIT1DT> | "ADSL.VISIT1DT" | xsd:double  |
## | <adsl-map.ttl#ADSL_CUMDOSE>  | "ADSL.CUMDOSE"  | xsd:double  |
## | <adsl-map.ttl#ADSL_SITEID>   | "ADSL.SITEID"   |             |
## | <adsl-map.ttl#ADSL_COMP24FL> | "ADSL.COMP24FL" |             |
## | <adsl-map.ttl#ADSL_ETHNIC>   | "ADSL.ETHNIC"   |             |
## ---------------------------------------------------------------------
```

Then dump the contents of a record in the database.

```
cd ../extdata/sample-rdf
arq --data adsl.ttl --query ADSL-record.rq
```

```
## ----------------------------------------------------------------------------------------------
## | s                                                      | p
## ==============================================================================================
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_E
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_C
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_C
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_S
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_A
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_H
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_C
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_W
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_B
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_A
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_S
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_R
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_S
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_C
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_R
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.w3.org/2000/01/rdf-schema#label>
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_S
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_A
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_E
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_A
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_D
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_M
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_V
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_U
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_I
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_B
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_R
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.w3.org/1999/02/22-rdf-syntax-ns#ty
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_S
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_R
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_V
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_A
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_T
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_R
```

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```
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_AI
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_SI
## | <http://www.example.org/datasets/ADSL/01-718-1254> | <http://www.example.org/datasets/vocab/ADSL_EI
## -----------------------------------------------------------------------------------------------
```

Get underlying data for one cube observation

```
cd ../extdata/sample-rdf
arq --data adsl.ttl --data DC-DEMO-sample.ttl --query DEMOobservations-R-data.rq
```

```
## ---------------------------------------------
## | record | p | o | CountCrit | XCountCrit |
## =============================================
## ---------------------------------------------
```

How to run this .Rmd file

.. add text ..