Disclaimer

I'm not a native speaker but I'm doing my best.

If I say something that may be interpreted as either negative or positive (e.g. a joke vs. an offense) I always, always, mean the positive.

Integration of SAS GRID environment and SF-36 Health Survey scoring API with SAS Packages

SD-262

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Takeda Pharmaceutical

www.takeda.com

Experis

Manpower Group

www.experis.com

www.polsug.com

#PolSUG

PARTIES and ROLES

Introduce yourself

We exist to create better health for people and a brighter future for the world. While the science and technology we advance are constantly evolving, our ambition remains. We move science forward, so we can transform more lives.[a]

Takeda Pharmaceuticals

Put simply, we measure health and well-being from the patient's point of view.[b]

QualityMetric Inc.

"If it's somethin' weird; And codes don't look good; Who ya gonna call?..."

Bart

[a] https://www.takeda.com/
[b] https://www.linkedin.com/company/qualitymetric-incorporated/

Roles in the play

- Takeda (est. 1781) required they patients data of the SF-36v2 Health Survey to be scored.
- Takeda provided working environment for statistical programmers on a SAS GRID server, where SDTM data were processed. The "appetite" was to execute scoring of SF-36v2 Health Survey data for patients in several clinical studies.
- QualityMetric provides REST API interface which allows to score data for several "quality of life" health surveys. Among offered scoring engines, one for scoring the SF-36v2 Health Survey data was available.
- Takeda and QM agreed the SF-36 scoring engine will be used to score Takeda's data.
- The humble presenter here was asked to write a program which "takes Takeda's survey data, pushes them into QM's scoring engine's API, retrieves results, and stores the results back on Takeda's GRID" and allows to execute all that process in the most comfortable way for statistical programmers working in Takeda.

APPROACH

The list of requirements for the project was rather short

- Multiple surveys can be scored in single run.
- Process has to be easily integrated into process of SDTM development.
- Log from the scoring should be available.

Solution

The K.I.S.S. (keep it simple, stupid) paradigm was adopted during the development and implementation process to make the interaction with the solution seamless and to minimize entry level for users.

After reading the QM API Implementation Guide and after analyzing test data format it was decided that, from the statistical programmer point of view, the most convenient approach would be:

- to prepare an input data set with survey responses in proper format, and
- to call a macro which would execute the process and return results.

Proposed approach to get it

- We decided to provide the code in form of a SAS Package.

K.I.S.S. - data set

- `STUDYID`, character, containing Study Identifier,
- `USUBJID`, character, containing Unique Subject Identifier,
- `QSSEQ`, numeric, containing consecutive numbers identifying rows,
- `QSTESTCD`, character, containing question short name in form `SFV201`, `SFV202`, ..., `SFV236`, where `01` suffix corresponds to the first question, `02` to the second, etc. up to `36` for thirty-sixth.
- `QSSTRESN`, numeric, containing "numeric finding in standard units", i.e. values of response for survey's questions.
- `VISIT`, character, containing visit name, e.g., `BASELINE`, `WEEK 1`, `WEEK 2`, etc.
- `QSDTC`, character, containing Date/Time of Finding in ISO8601 format.

K.I.S.S. - the code

code: all that is needed

```
filename packages "/my/directory/for/packages";
%include packages(SPFinit.sas);
%loadPackage(QMsf36scoring)

%QualityMetricsRESTAPIsf36(
  /* inDs - input data set - the only positional parameter */
     <Library.Data-set-with-survey-data>
  /* connection parameters */
    ,globalKey=********-****-****-****-************
    ,groupID=******
    ,groupLogin=***-*****-******
    ,serverAddress=api-staging.qualitymetric.com
    ,siteLogin=***-***-****
    ,surveyID=52627 /* 52627 is ID for "sf36 acute" survey */
  /* output */
    ,scoredLib=<Library-to-store-results>
    ,scoredDS=<Results-data-set-name>
)
```

K.I.S.S. - result

The "final" data set contains the following variables:

- six character variables: `memberID`, `USUBJID`, `siteLogin`, `sessionID`, `QSDTC`, `VISIT` which allows merging with input data set, and
- remaining numeric ones: `PFScore`, `RPScore`, `BPScore`, `GHScore`, `VTScore`, `SFScore`, `REScore`, `MHScore`, `PCSScore`, `MCSScore`, `PF_0_100`, `RP_0_100`, `BP_0_100`, `GH_0_100`, `VT_0_100`, `SF_0_100`, `RE_0_100`, `MH_0_100`, `SF6D_R2`, and `SF6DV2_UK`, with scores.

UNDER THE HOOD

"Engine Parts"

The `QMsf36scoring` Package is:

- Macros:
  - `%QualityMetricsRESTAPIsf36()`
  - `%getToken()`
  - `%getSurveyScore()`
- Formats:
  - `_1_3valuecheck.`
  - `_1_5valuecheck.`
  - `_1_6valuecheck.`
  - `$sf36decode.`

Assuming that the user prepared the data set and provided valid credentials the process under the `%QualityMetricsRESTAPIsf36()` macro goes the following way:

The process, steps 1 - 4

1. Data to be scored are sub-selected with a "`QSTESTCD like 'SFV2%'`" where condition, and only required variables are kept. If this step fails the `%QualityMetricsRESTAPIsf36()` macro ends execution.

2. Temporary libraries (`SrvSrc` and `_`) are created, all are created as sub-directories of the `WORK` library location with help of the `dlCreateDir` option.

3. Number of survey questions is verified for each survey, and mismatches, if exist, are printed out.

4. Survey answers are formatted with help of `_1_*valuecheck` formats to align values with API requirements.

The process, steps 5 - 6

5. A data step which reads in the input data and generates `JSON` files is executed. A list of `JSON` files is created in the `SurveyDataFiles` sub-directory of the `WORK` library. Each survey gets its own dedicated `JSON` file in a format required by the API.

6. The `%getToken()` macro is called to obtain authentication token. The `Proc HTTP` does the job. If the `%getToken()` fails (e.g., `Proc HTTP`'s status code is different than 200) the `%QualityMetricsRESTAPIsf36()` macro is terminated.

The process, sub-steps in 7

7. Internal loop over the list of `JSON` files is run. In each iteration the `%getSurveyScore()` macro is called.

   A single call to the macro does the following:

   a) The `Proc HTTP` calls to QM REST API and sends survey data for scoring. If scoring fails a warning is issued in the log, data are not collected for a given survey, and macro terminates.

   b) When scoring is successful a temporary file with results in `JSON` format is created.

   c) The `JSON libname` engine creates a temporary library, named `J`, which is pointing to results in just created `JSON` file.

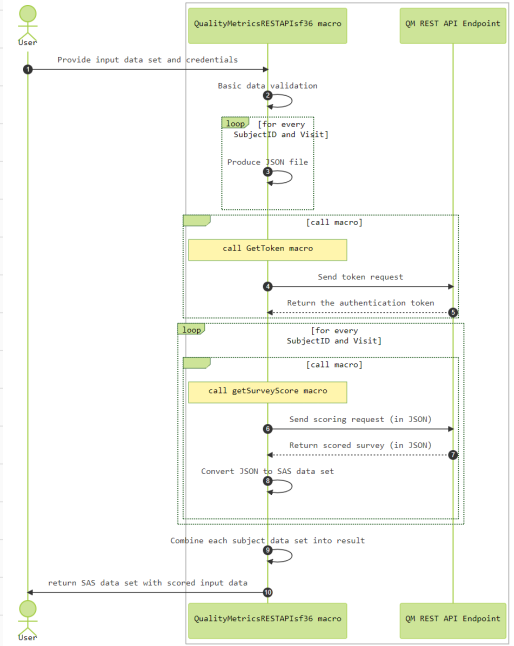
   d) Information about subject, survey fields, and scores are extracted from `J.ALLDATA` data set, transposed from long to wide format, and combined into one data set named `SrvScr.SurveyRecord*` (asterisk indicates sequence number of an iteration).

The process, steps 8 - 9

8. Since results from each `JSON` can produce a data set with different variables lengths, the lengths are unified.

9. The "final" data set, combining results from `SrvScr.SurveyRecord*` data sets with unified variables lengths, is generated.

One picture for a 1000 words



dziękuję

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