Overview

This project was designed to create a middle-man Python program to transfer data from REDCap to MySQL, and vice versa. It takes advantage of the REDCap Application Programming Interface (API) functionality, which allows data or settings to be programmatically modified remotely. It uses existing Python modules, mainly [PyCap](https://pycap.readthedocs.io/en/latest/), [requests](http://docs.python-requests.org/en/master/user/install/#install), and [MySQL Python Connector](https://dev.mysql.com/downloads/connector/python/).

Getting started

Requirements

For detailed installation instructions and documentation, please clink the links below and follow the corresponding instructions.

* REDCap ([Technical Overview](https://projectredcap.org/REDCapTechnicalOverview.pdf), [Software](https://projectredcap.org/software/))

To be able to use REDCap for data transfers such as this one, additional requirements within the project must be met. First, the user must have API Export and Import/Update privileges. Once that task is done, a token can be requested, which is unique for each project and is used for security purposes. After a token is obtained, that along with the project URL will be needed for every API request.

* [Python 3+](https://www.python.org/downloads/)

(Note: I used 3.6.2)

* MySQL Client ([Windows](https://dev.mysql.com/downloads/workbench/), [Mac](https://www.sequelpro.com/)) to access a MySQL database

(Note: I found the above MySQL Clients to be easy and user friendly on Windows and Macs, respectively.)

* Additional Python modules:
  + [Semantic version](https://pypi.python.org/pypi/semantic_version/)
  + [Pandas](http://pandas.pydata.org/)
  + Listed above:
    - [PyCap](https://pycap.readthedocs.io/en/latest/), [Requests](http://docs.python-requests.org/en/master/user/install/#install), [MySQL Python Connector](https://dev.mysql.com/downloads/connector/python/)
  + The below should be installed with Requests, but if not:
    - [Certifi](https://pypi.python.org/pypi/certifi)
    - [Chardet](https://pypi.python.org/pypi/chardet)
    - [Idna](https://pypi.python.org/pypi/idna)
    - [Urllib3](https://pypi.python.org/pypi/urllib3)

Installation

To download the Python program, go to <https://github.com/mconcato/YCMI/tree/master/Program>.

Using the Program

Python Program Files

Five Python files currently make up the program. The first two are libraries that consist of functions and methods for transferring data from MySQL to REDCap, or vice versa. The next two are drivers that use their corresponding library to execute respective transfers. The last is used to store the information, including passwords, URLs, and tokens for REDCap projects and MySQL databases.

* REDCap\_to\_MySQL\_Transfer.py
* MySQL\_to\_REDCap\_Transfer.py
* to\_MySQL.py
* to\_REDCap.py
* passwords.py

How to Enter Your Specific Information

The first step is to store the MySQL database and REDCap project in the ‘passwords.py’ file. To add a new MySQL database for use, it should be stored as follows:

*Mysql\_Tables[‘database name’] = [‘user’, ‘password’, ‘server name’]*

To store a REDCap project for use, it should be stored as follows:

*REDCap\_Projects[‘project name’] = [‘project URL, ‘project token’]*

After you either create a new database and project, or add new ones, the next step is to go to the transfer file which you would like to execute: ‘to\_MySQL’ or ‘to\_REDCap’. Lines 6-7 of the file should start with MYSQL\_IMPORTED/EXPORTED\_DATABASE or REDCAP\_IMPORTED/EXPORTED\_PROJECT. Fill in the quotes with the database and project you would like to import from and export to. Then, run the file, and follow the prompts to execute the desired actions.

It should be noted that there is no current way to import metadata for a REDCap project. If you are trying to transfer from MySQL to REDCap, an existing project and matching instrument must exist. The variable names must be exact, and the data types must be able to match what is in the MySQL database.

Limitations

Due to the nature of REDCap and MySQL, many differences exist that I could not overcome at this point. The data types, for example, are different and unique in some cases. For example, REDCap offers data types for online signatures and file uploads; these types of data do not translate easily into a MySQL database, so I did not include the functionality for attempting to deal with those types of data. At this point, having a project with either those will not work.

In addition, as mentioned above, using the PyCap Python module, there is no way to import metadata for a project. When transferring from REDCap to MySQL, the program can create a table or overwrite an existing one, but transferring in the other direction is not as easy as simply running the program.

This program is designed to transfer an entire REDCap project or MySQL database all at once. It can transfer a single record or multiple records into REDCap or MySQL, but at this point it is not as straightforward as transferring the whole dataset.

Future Work

This program is the foundation of what could be built into a larger and more complete program for transferring data between REDCap and MySQL, and potentially other databases. Some ideas that I did not have time to implement at this point would be: 1) add an option to create relational tables when transferring to MySQL, if a variable is a dropdown, radio, checkbox, yes/no, or true/false; 2) add the ability to transfer all REDCap data types to MySQL (files and signatures); 3) add the ability to create a REDCap project and/or create a new instrument, so that the process of transferring to REDCap will be easier, and with it develop a system for translating MySQL data types into REDCap; and 4) improve overall usability and efficiency.

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Completed during summer 2017 Internship at Yale Center for Medical Informatics, with Dr. Cynthia Brandt, Dr. Kei Cheung, and Mr. Charles Lu.

PyCap citation:

Burns, S. S., Browne, A., Davis, G. N., Rimrodt, S. L., & Cutting, L. E. PyCap (Version 1.0) [Computer Software]. Nashville, TN: Vanderbilt University and Philadelphia, PA: Childrens Hospital of Philadelphia. Available from <https://github.com/sburns/PyCap>. doi:10.5281/zenodo.9917