Updating Open mHealth's Mobility Classification DPU

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Abstract—Open mHealth's oldest public repository is dpu.cens.mobility_classifier (GitHub, 2012). The repository's About section states that it is a "DPU that classifies phone activity data into mobility modes". While the binary generated from this project may still be in use in some environments, it is currently impossible to build the project in its present state. Fixing this, as well as updating some of its code, may help interoperability efforts.

1 BACKGROUND AND SIGNIFICANCE

The dpu.cens.mobility_classifier repository uses raw data from accelerometers and wi-fi data points to classify the data into mobility modes. The modes that are outputted are one of the following: error, still, walk, run, or drive. This project can be used by any mobile health application that wants to know what kind of physical activity a patient is doing. This information can be used to track whether a patient is getting the exercise that a doctor prescribed to assist with their increased risk of heart disease, still the #1 killer in the US. Alternatively, it can be used to tell whether a patient is not moving when they're expected to be, due to an injury or illness like a stroke. It can be used to tell whether a patient is on their way into a doctor's office, via a car or train or mass transit. As the technologies used to track patient mobility are still relatively new and constantly changing, this library should be easy to compile for developers of these new technologies.

2 PROBLEM

Starting from Open mHealth's website (http://www.openmhealth.org/), there is a link to its github account (https://github.com/openmhealth). Looking at the oldest repository on this account, the dpu.cens.mobility_classifier repository was found to have been last modified 2012-03-09, over 9 years ago. The README of the repository tells the user to execute this command to generate a jar file, the output of the project: `ant clean dist-jar`. However, when executing that command (after installing ant on my MacOS laptop via the commands `brew update`, `brew upgrade`, and `brew install ant`), the output of the ant command to generate the jar file gave these warnings and errors:

```
% ant clean dist-jar
```

```
Buildfile: /[...]/dpu.cens.mobility_classifier/build.xml

clean:

javac:

[mkdir] Created dir: /[...]/dpu.cens.mobility_classifier/build/classes

[javac] /[...]/dpu.cens.mobility_classifier/build.xml:39: warning:
'includeantruntime' was not set, defaulting to
build.sysclasspath=last; set to false for repeatable builds

[javac] Compiling 6 source files to
/[...]/dpu.cens.mobility_classifier/build/classes

[javac] warning: [options] bootstrap class path not set in conjunction
with -source 6

[javac] error: Source option 6 is no longer supported. Use 7 or later.

[javac] error: Target option 6 is no longer supported. Use 7 or later.

BUILD FAILED

/[...]/dpu.cens.mobility_classifier/build.xml:39:  Compile  failed;  see
the compiler error output for details.

Total time: 0 seconds
```

In less than 1 second, the build failed. (Note that the full file paths have been redacted: /[...]/.) Not to jump ahead out of turn to the Solution section, after a fix was attempted for this problem in one way, another problem popped up. The details of how this first fix was attempted can be found the Solution section, but the outcome of this first attempt was as follows:

```
% ant clean

Buildfile: /[...]/dpu.cens.mobility_classifier/build.xml

clean:

[delete] Deleting directory /[...]/dpu.cens.mobility_classifier/build

BUILD SUCCESSFUL

Total time: 0 seconds
```

```
% ant dist-jar

Buildfile: /[...]/dpu.cens.mobility_classifier/build.xml

javac:

[mkdir] Created dir: /[...]/dpu.cens.mobility_classifier/build/classes

[javac] /[...]/dpu.cens.mobility_classifier/build.xml:39: warning:
'includeantruntime' was not set, defaulting to
build.sysclasspath=last; set to false for repeatable builds

[javac] Compiling 6 source files to
/[...]/dpu.cens.mobility_classifier/build/classes

[javac] warning: [options] bootstrap class path not set in conjunction
with -source 7

[javac] warning: [options] source value 7 is obsolete and will be
removed in a future release

[javac] warning: [options] target value 7 is obsolete and will be
removed in a future release

[javac] warning: [options] To suppress warnings about obsolete
options, use -Xlint:-options.

[javac] 4 warnings

[copy] Copying 2 files to
/[...]/dpu.cens.mobility_classifier/build/classes

dist-jar:

[mkdir] Created dir: /[...]/dpu.cens.mobility_classifier/dist

 [jar] Building jar:
/[...]/dpu.cens.mobility_classifier/dist/omh-dpu-cens-mobility_classif
ier-1.0.jar

BUILD SUCCESSFUL

Total time: 0 seconds
```

The time the build was successful, but there were still warnings about the version being used to compile the code.

3 SOLUTION

3.1 Narrative Summary

The first solution was to edit the `build.xml` file to change the version of Java being used from 1.6 to 1.7. After this was done, the build succeeded, but was still throwing a warning about the version of Java being obsolete and deprecated. The next solution was to edit the `build.xml` file to change the version of Java being used from 1.7 to 1.8. After this was done, the build succeeded and did so without any warnings. The output of the build was then as follows:

```
% ant clean dist-jar

Buildfile: /[...]/dpu.cens.mobility_classifier/build.xml

clean:

[delete] Deleting directory /[...]/dpu.cens.mobility_classifier/build

[delete] Deleting directory /[...]/dpu.cens.mobility_classifier/dist

javac:

[mkdir] Created dir: /[...]/dpu.cens.mobility_classifier/build/classes

[javac] Compiling 6 source files to
/[...]/dpu.cens.mobility_classifier/build/classes

[copy] Copying 2 files to
/[...]/dpu.cens.mobility_classifier/build/classes

dist-jar:

[mkdir] Created dir: /[...]/dpu.cens.mobility_classifier/dist

[jar] Building jar:
/[...]/dpu.cens.mobility_classifier/dist/omh-dpu-cens-mobility_classif
ier-1.0.jar

BUILD SUCCESSFUL

Total time: 0 seconds
```

Note that this time there were no warnings thrown from the compiler.

3.2 Technologies Used

The program used to copy the code from the original repository to the new one was `GitHub Desktop` (GitHub, 2021). (I've used the more popular application `SourceTree` in the past, but lately it's not been as reliable as `GitHub Desktop` for my MacBook Pro laptop.) Since the original repository was on a domain different from my new repository (`github.com` and `github.gatech.edu`, respectively), forking the old repository to the new one was not straightforward, so instead I copied the old code into my new repository, making sure to refer the original in both my repository's *Description* and at the top of the new repository's *README*.

I viewed and analyzed the code using the popular Java IDE `IntelliJ` - specifically `IntelliJ IDEA Edu` (JetBrains, 2021). However, since the code was designed to be built utilizing the build technology known as `ant`, I couldn't use `IntelliJ` to build the project. I installed `ant` using `brew` (Homebrew, 2021). Once that was installed, I could easily build the project from the command line using Mac's built-in command line utility application `Terminal`.

4 COMPLEXITY / EFFORT

The changes made were done to the `build.xml` file at the root of the project. In its final form, only two lines were changed. This line (line 38):

```
<javac destdir="${build}/classes" source="1.6" target="1.6"
```

was changed to this:

```
<javac destdir="${build}/classes" source="1.8" target="1.8"
```

and this line (line 65):

```
<javadoc destdir="${build}/docs" private="true" link="http://java.sun.com/javase/6/docs/api/"
```

 was changed to this:

```
<javadoc destdir="${build}/docs" private="true" link="http://java.sun.com/javase/8/docs/api/"
```

5 TECHNICAL / USER DOCUMENTATION

5.1 Link to Codebase

The link to the new repository is here:

 https://github.gatech.edu/dstrube3/dpu.cens.mobility_classifier.

6 REFERENCES

1. Openmhealth. openmhealth/dpu.cens.mobility_classifier. GitHub. (2012). https://github.com/openmhealth/dpu.cens.mobility_classifier. Accessed March 28, 2021.

2. GitHub Desktop Documentation. GitHub Desktop Documentation - GitHub (2021). https://docs.github.com/en/desktop. Accessed March 28, 2021.

3. IntelliJ IDEA: The Capable & Ergonomic Java IDE by JetBrains. JetBrains. (2021). https://www.jetbrains.com/idea/. Accessed March 28, 2021.

4. Homebrew. Homebrew. (2021). https://brew.sh/. Accessed March 28, 2021.