

SPRAWOZDANIE

Zajęcia: Informatyczne Systemy Medyczne
Prowadzący: prof. dr hab. Vasyl Marstenyuk

Laboratorium: Zajęcie 4

Data: 18.11.2020 r.

Temat: „Użycie standardu obrazów medycznych DICOM”








































Wariant 1

Szymon Pęczalski
Informatyka II stopień,
stacjonarne,
2 semestr,
Gr. B

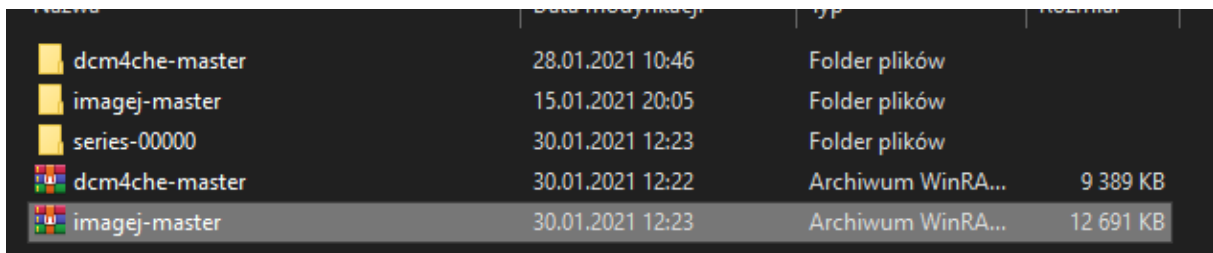
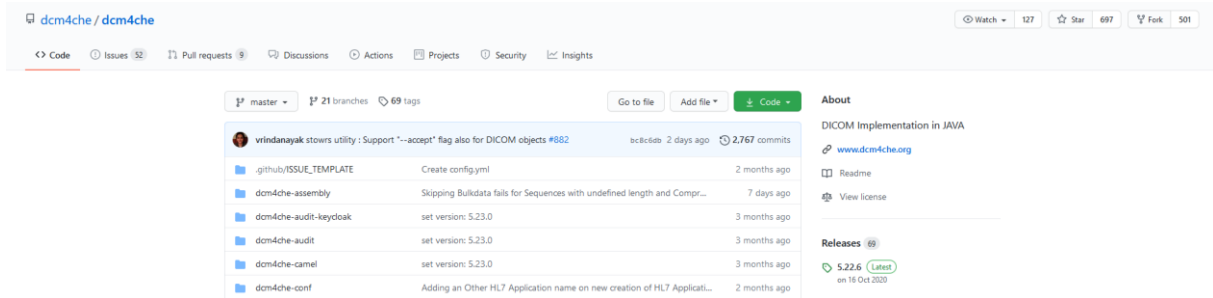
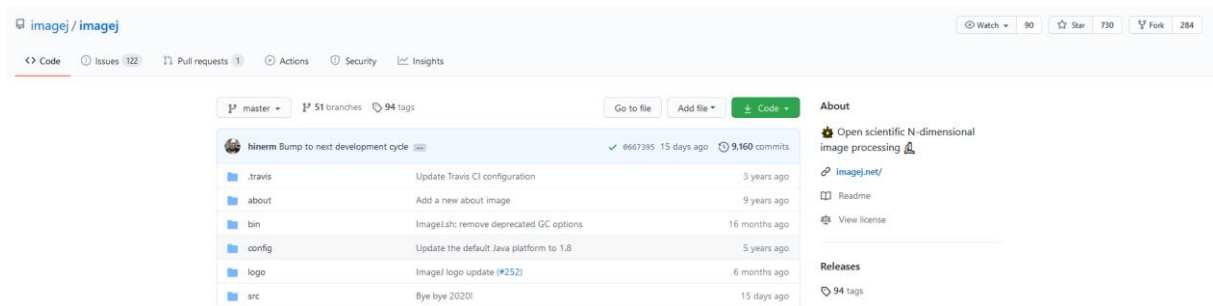
<https://github.com/SzPeczalski/ISM>

Cel ćwiczenia: Używając kody źródłowe **ImageJ** opracować player skompresowanych plików DICOM według wariantu

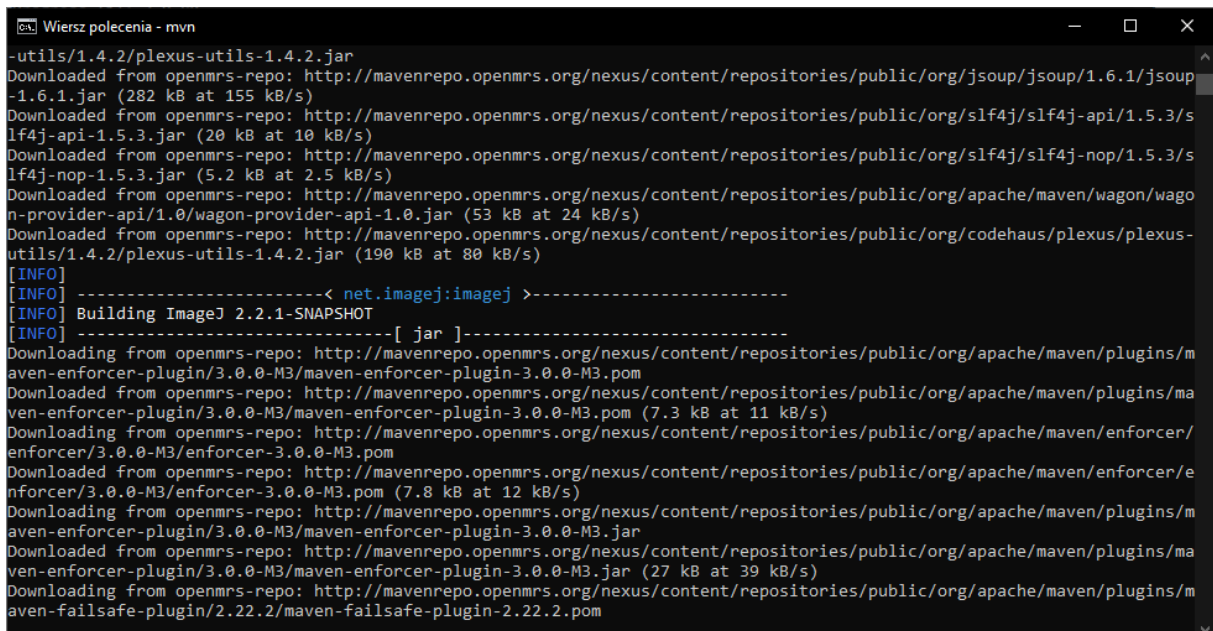
1. Pobranie i wypakowanie zdjęć:

Nazwa	Data modyfikacji	Typ	Rozmiar
 image-00001	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00002	17.11.2020 21:05	IrfanView DCM File	93 KB
 image-00003	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00004	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00005	17.11.2020 21:05	IrfanView DCM File	94 KB
 image-00006	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00007	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00008	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00009	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00010	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00011	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00012	17.11.2020 21:05	IrfanView DCM File	92 KB
 image-00013	17.11.2020 21:05	IrfanView DCM File	92 KB
 image-00014	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00015	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00016	17.11.2020 21:05	IrfanView DCM File	97 KB
 image-00017	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00018	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00019	17.11.2020 21:05	IrfanView DCM File	87 KB
 image-00020	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00021	17.11.2020 21:05	IrfanView DCM File	91 KB
 image-00022	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00023	17.11.2020 21:05	IrfanView DCM File	88 KB
 image-00024	17.11.2020 21:05	IrfanView DCM File	88 KB
 image-00025	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00026	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00027	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00028	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00029	17.11.2020 21:05	IrfanView DCM File	91 KB
 image-00030	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00031	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00032	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00033	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00034	17.11.2020 21:05	IrfanView DCM File	89 KB
 image-00035	17.11.2020 21:05	IrfanView DCM File	91 KB
 image-00036	17.11.2020 21:05	IrfanView DCM File	87 KB
 image-00037	17.11.2020 21:05	IrfanView DCM File	88 KB
 image-00038	17.11.2020 21:05	IrfanView DCM File	90 KB
 image-00039	17.11.2020 21:05	IrfanView DCM File	90 KB

2. Pobranie i wypakowanie **imageJ** oraz **dcm4che** z repozytorium GitHub:



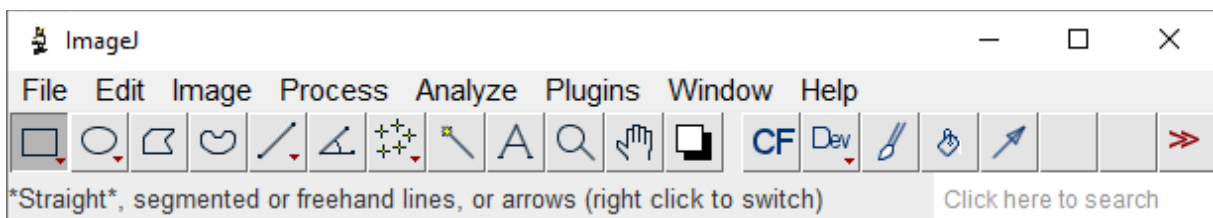
3. Instalacja **imageJ** komendą **mvn** w folderze:

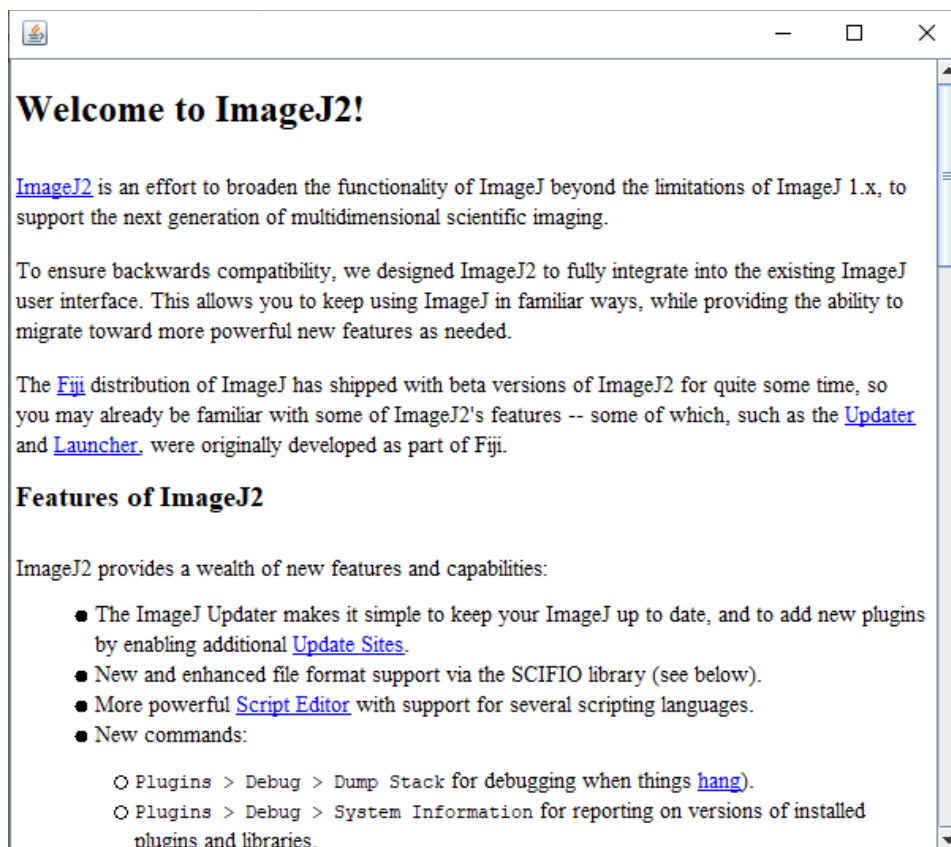


4. Uruchomienie **imageJ**:

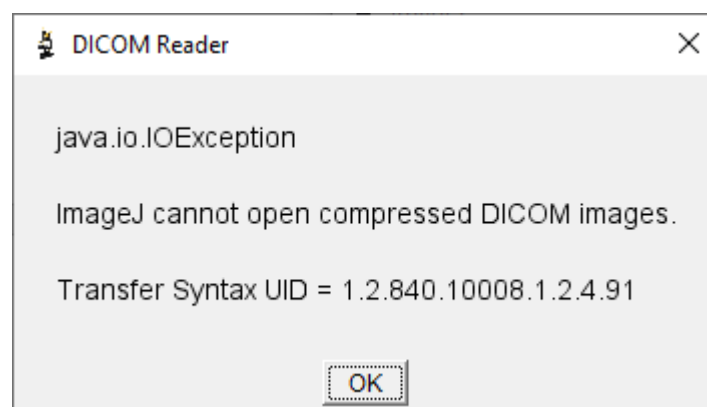
```
WybierzWiersz polecenia - mvn -Pexec
[INFO] Installing d:\Users\User1\Desktop\ISM_4\Wariant1\imagej-master\pom.xml to d:\Users\User1\.m2\repository\net\imagej\imagej\2.2.1-SNAPSHOT\imagej-2.2.1-SNAPSHOT.pom
[INFO] Installing d:\Users\User1\Desktop\ISM_4\Wariant1\imagej-master\target\imagej-2.2.1-SNAPSHOT-sources.jar to d:\Users\User1\.m2\repository\net\imagej\imagej\2.2.1-SNAPSHOT\imagej-2.2.1-SNAPSHOT-sources.jar
[INFO] Installing d:\Users\User1\Desktop\ISM_4\Wariant1\imagej-master\target\imagej-2.2.1-SNAPSHOT-tests.jar to d:\Users\User1\.m2\repository\net\imagej\imagej\2.2.1-SNAPSHOT\imagej-2.2.1-SNAPSHOT-tests.jar
[INFO]
[INFO] --- scijava-maven-plugin:2.0.0:populate-app (populate-app) @ imagej ---
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 09:29 min
[INFO] Finished at: 2021-01-30T12:56:18+01:00
[INFO]
-----
d:\Users\User1\Desktop\ISM_4\Wariant1\imagej-master>mvn -Pexec
[INFO] Scanning for projects...
[INFO]
[INFO] -----< net.imagej:imagej >-----
[INFO] Building ImageJ 2.2.1-SNAPSHOT
[INFO] -----[ jar ]-----
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/mojo/exec-maven-plugin/1.6.0/exec-maven-plugin-1.6.0.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/mojo/exec-maven-plugin/1.6.0/exec-maven-plugin-1.6.0.pom (13 kB at 8.4 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/mojo/exec-maven-plugin/1.6.0/exec-maven-plugin-1.6.0.jar
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/mojo/exec-maven-plugin/1.6.0/exec-maven-plugin-1.6.0.jar (58 kB at 82 kB/s)
```

```
Wiersz polecenia - mvn -Pexec
log4j:WARN No appenders could be found for logger (org.bushe.swing.event.EventService).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 3.384 s - in net.imagej.app.MainTest
[INFO] Running net.imagej.app.ServiceCompletenessTest
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.254 s - in net.imagej.app.ServiceCompletenessTest
[INFO] Running net.imagej.app.ToplevelImageJAppTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.123 s - in net.imagej.app.ToplevelImageJAppTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] --- exec-maven-plugin:1.6.0:exec (default) @ imagej ---
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/plexus/plexus-utils/3.0.20/plexus-utils-3.0.20.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/plexus/plexus-utils/3.0.20/plexus-utils-3.0.20.pom (3.8 kB at 2.3 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/plexus/plexus-utils/3.0.20/plexus-utils-3.0.20.jar
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/codehaus/plexus/plexus-utils/3.0.20/plexus-utils-3.0.20.jar (243 kB at 201 kB/s)
[ECLIPSE HELPER] Indexing annotations...
log4j:WARN No appenders could be found for logger (org.bushe.swing.event.EventService).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
```





5. Przy próbie otworzenia zdjęcia pojawia się komentarz:



Program nie odczytuje skompresowanych plików obrazów DICOM.

6. Instalacja dcm4che:

```
Wiersz polecenia - mvn install

d:\Users\User1\Desktop\ISM_4>cd Wariant1

d:\Users\User1\Desktop\ISM_4\Wariant1>cd dcm4che-master

d:\Users\User1\Desktop\ISM_4\Wariant1\dcm4che-master>mvn install
[INFO] Scanning for projects...
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-ssh/3.3.2/wagon-ssh-3.3.2.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-ssh/3.3.2/wagon-ssh-3.3.2.pom (6.5 kB at 4.3 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-providers/3.3.2/wagon-providers-3.3.2.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-providers/3.3.2/wagon-providers-3.3.2.pom (2.8 kB at 4.3 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-3.3.2/wagon-3.3.2.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-3.3.2/wagon-3.3.2.pom (21 kB at 30 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/com/jcraft/jsch.agentproxy.connector-factory/0.0.9/jsch.agentproxy.connector-factory-0.0.9.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/com/jcraft/jsch.agentproxy.connector-factory/0.0.9/jsch.agentproxy.connector-factory-0.0.9.pom (1.7 kB at 2.5 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/com/jcraft/jsch.agentproxy/0.0.9/jsch.agentproxy-0.0.9.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/com/jcraft/jsch.agentproxy/0.0.9/jsch.agentproxy-0.0.9.pom (4.3 kB at 6.6 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/com/jcraft/jsch.agentproxy.core/0.0.9/jsch.agentproxy.core-0.0.9.pom
```

```
Wiersz polecenia

[INFO] dcm4che-tool-json2csv ..... SUCCESS [ 0.174 s]
[INFO] dcm4che-tool-json2dcm ..... SUCCESS [ 0.192 s]
[INFO] dcm4che-tool-json2index ..... SUCCESS [ 0.160 s]
[INFO] dcm4che-tool-json2rst ..... SUCCESS [ 0.167 s]
[INFO] dcm4che-tool-movescu ..... SUCCESS [ 0.209 s]
[INFO] dcm4che-tool-mppsscp ..... SUCCESS [ 0.194 s]
[INFO] dcm4che-tool-pdf2dcm ..... SUCCESS [ 0.219 s]
[INFO] dcm4che-tool-planarconfig ..... SUCCESS [ 0.198 s]
[INFO] dcm4che-tool-storescp ..... SUCCESS [ 0.204 s]
[INFO] dcm4che-tool-stowrs ..... SUCCESS [ 0.344 s]
[INFO] dcm4che-tool-swappxdata ..... SUCCESS [ 0.185 s]
[INFO] dcm4che-tool-syslog ..... SUCCESS [ 0.202 s]
[INFO] dcm4che-tool-syslogd ..... SUCCESS [ 0.190 s]
[INFO] dcm4che-tool-tp12xml ..... SUCCESS [ 0.224 s]
[INFO] dcm4che-tool-upsscu ..... SUCCESS [ 0.214 s]
[INFO] dcm4che-tool-wadors ..... SUCCESS [ 0.203 s]
[INFO] dcm4che-tool-wadows ..... SUCCESS [02:04 min]
[INFO] dcm4che-tool-xml2dcm ..... SUCCESS [ 0.191 s]
[INFO] dcm4che-tool-xml2h17 ..... SUCCESS [ 0.184 s]
[INFO] dcm4che-assembly ..... SUCCESS [01:52 min]
[INFO] dcm4che-jboss-modules ..... SUCCESS [ 49.250 s]
[INFO] dcm4che-camel ..... SUCCESS [ 12.141 s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 13:11 min
[INFO] Finished at: 2021-01-30T13:19:47+01:00
[INFO] -----

d:\Users\User1\Desktop\ISM_4\Wariant1\dcm4che-master>
```

7. Po wypakowaniu otworzono wiersz poleceń w celu konwersji zdjęć na format .jpg:

```
Wiersz polecenia

d:\Users\User1\Desktop\ISM_4\Wariant1\dcM4che-master\dcM4che-assembly>cd target

d:\Users\User1\Desktop\ISM_4\Wariant1\dcM4che-master\dcM4che-assembly\target>cd dcM4che-5.23.0-bin
'dcM4che-5.23.0-bin' is not recognized as an internal or external command,
operable program or batch file.

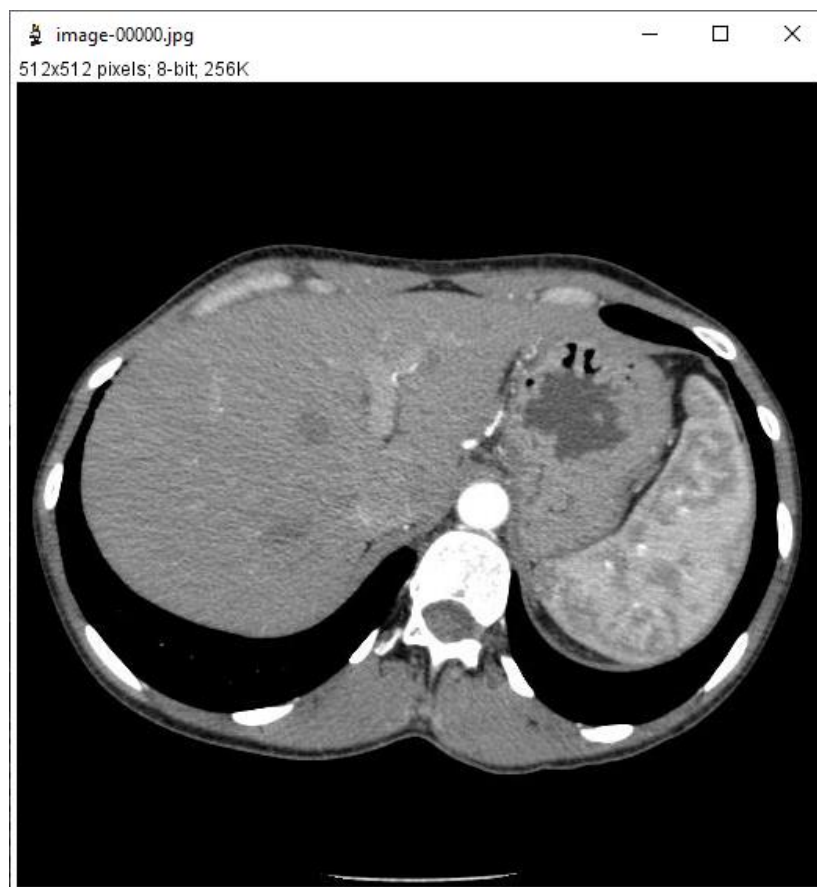
d:\Users\User1\Desktop\ISM_4\Wariant1\dcM4che-master\dcM4che-assembly\target>cd dcM4che-5.23.0-bin

d:\Users\User1\Desktop\ISM_4\Wariant1\dcM4che-master\dcM4che-assembly\target\dcM4che-5.23.0-bin>cd dcM4che-5.23.0\bin

d:\Users\User1\Desktop\ISM_4\Wariant1\dcM4che-master\dcM4che-assembly\target\dcM4che-5.23.0-bin\dcM4che-5.23.0\bin> dcm2jpg d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000\image-00000.dcm d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000\image-00000.jpg
13:24:42,615 DEBUG - Decompressor: org.dcm4che3.opencv.NativeImageReader
13:24:42,617 DEBUG - wasPos 0 end 89124
13:24:42,617 DEBUG - Start decompressing frame #1
sty 30, 2021 1:24:42 PM org.opencv.osgi.OpenCVNativeLoader init
INFO: Successfully loaded OpenCV native library.
13:24:42,682 DEBUG - Finished decompressing frame #1
d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000\image-00000.dcm -> d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000\image-00000.jpg

























d:\Users\User1\Desktop\ISM_4\Wariant1\dcM4che-master\dcM4che-assembly\target\dcM4che-5.23.0-bin\dcM4che-5.23.0\bin>
```

8. Po konwersji otworzono zdjęcie w imageJ:



























9. Zmiana formatu wszystkich plików (dcm2jpg):

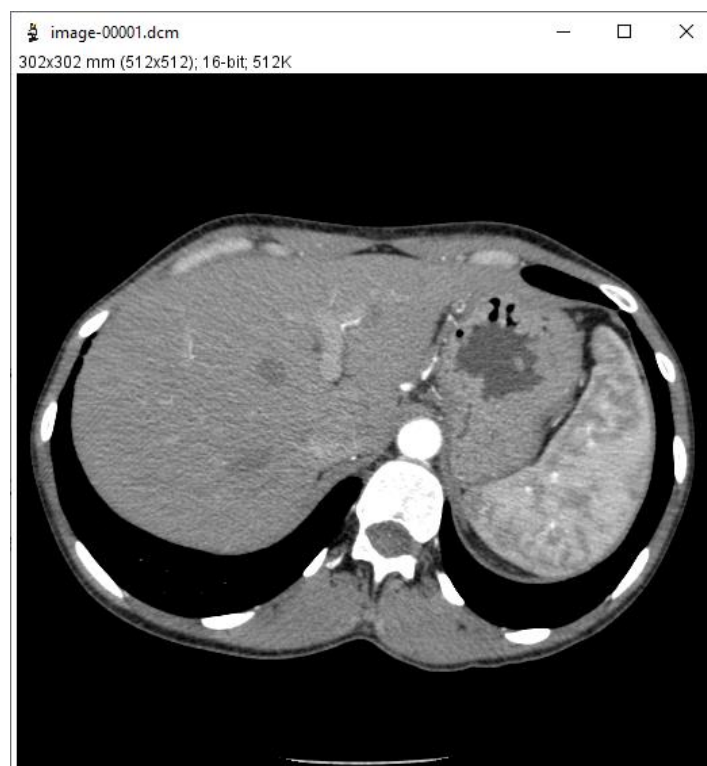
```
d:\Users\User1\Desktop\ISM_4\Wariant1\dcm4che-master\dcm4che-assembly\target\dcm4che-5.23.0-bin\dcm4che-5.23.0\
bin>dcm2jpg d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000 d:\Users\User1\Desktop\ISM_4\Wariant1\series-000
00\jpgs
13:29:56,855 DEBUG - Decompressor: org.dcm4che3.opencv.NativeImageReader
13:29:56,857 DEBUG - wasPos 0 end 89124
13:29:56,858 DEBUG - Start decompressing frame #1
sty 30, 2021 1:29:56 PM org.opencv.osgi.OpenCVNativeLoader init
INFO: Successfully loaded OpenCV native library.
13:29:56,906 DEBUG - Finished decompressing frame #1
d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000\image-00000.dcm -> d:\Users\User1\Desktop\ISM_4\Wariant1\ser
ies-00000\jpgs\image-00000.dcm.jpeg
Failed to convert d:\Users\User1\Desktop\ISM_4\Wariant1\series-00000\image-00000.jpg: Not a DICOM Stream
org.dcm4che3.io.DicomStreamException: Not a DICOM Stream
    at org.dcm4che3.io.DicomInputStream.guessTransferSyntax(DicomInputStream.java:919)
    at org.dcm4che3.io.DicomInputStream.<init>(DicomInputStream.java:138)
    at org.dcm4che3.io.DicomInputStream.<init>(DicomInputStream.java:133)
    at org.dcm4che3.imageio.plugins.dcm.DicomImageReader.readMetadata(DicomImageReader.java:747)
    at org.dcm4che3.imageio.plugins.dcm.DicomImageReader.read(DicomImageReader.java:445)
    at org.dcm4che3.tool.dcm2jpg.Dcm2Jpg.readImage(Dcm2Jpg.java:401)
    at org.dcm4che3.tool.dcm2jpg.Dcm2Jpg.convert(Dcm2Jpg.java:395)
    at org.dcm4che3.tool.dcm2jpg.Dcm2Jpg.mconvert(Dcm2Jpg.java:382)
```

Nazwa	Data modyfikacji	typ	Rozmiar
 image-00000.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00001.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00002.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00003.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00004.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00005.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00006.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00007.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00008.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00009.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00010.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00011.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00012.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00013.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00014.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00015.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00016.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00017.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00018.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00019.dcm	30.01.2021 13:29	Plik JPEG	29 KB
 image-00020.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00021.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00022.dcm	30.01.2021 13:29	Plik JPEG	30 KB
 image-00023.dcm	30.01.2021 13:29	Plik JPEG	30 KB

10. Zamiana formatu plików na nieskompresowany .dcm (**ddcm2dcm**):

 image-00000	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00001	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00002	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00003	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00004	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00005	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00006	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00007	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00008	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00009	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00010	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00011	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00012	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00013	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00014	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00015	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00016	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00017	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00018	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00019	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00020	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00021	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00022	30.01.2021 13:45	IrfanView DCM File	515 KB
 image-00023	30.01.2021 13:45	IrfanView DCM File	515 KB

11. Możliwe jest otwarcie plików .dcm w **imageJ**:



12. Wnioski:

Po przekształceniu za pomocą **dcm4che** plików na format akceptowalny przez **imageJ**
- .jpg lub .dcm nieskompresowany za pomocą plików wsadowych **dcm2dcm** i **dcm2jpg**
możliwe jest ich uruchomienie w **imageJ**.