

SPRAWOZDANIE

Zajęcia: Informatyczne Systemy Medyczne

Prowadzący: prof. dr hab. Vasyl Martsenyuk

Laboratorium: 4

Data: 18.11.2020

Temat: „Użycie standardu obrazów medycznych DICOM”

Wariant: 3

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Informatyka II stopień,

Stacjonarne,

2 semestr,

Gr. B

<https://github.com/jacekaGIT/ATH-1g>

1. Polecenia:

Używając kody źródłowe ImageJ opracować przeglądarkę skompresowanych plików DICOM według wariantu.

References

Standard <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3354356/>
Biblioteka obrazów <https://www.dicomlibrary.com/>

Utilities dcm4che:

Strona <https://www.dcm4che.org/>

Download <https://sourceforge.net/projects/dcm4che/files/dcm4che3/>

Examples:

dcm2xml - Convert DICOM to xml

dcm2dcm -jpl1 img.dcm jpl1.dcm - Compress DICOM image in.dcm to jpl1.dcm with JPEG Lossless, Non-Hierarchical, First-Order Prediction

dcm2dcm jpl1.dcm out.dcm - Decompress DICOM image jpl1.dcm to out.dcm with Explicit VR Little Endian Transfer Syntax

ImageJ:

Strona projektu imagej.net

Strona developera <https://imagej.net/Develop>

Kody źródłowe https://imagej.net/Source_code

Wersja skryptowa ImageJ:

<https://ij.imjoy.io/>

Dokumentacja developera <https://imagej.nih.gov/ij/developer/index.html>

2. Wprowadzane dane:

- Komendy z konsoli
- Obrazy *.dcm
-

3. Komendy, wyniki działania, zrzuty ekranu:

3.1. Pobranie obrazów, wypakowanie.

damczyk > Dysk Google > ATH 2 > ISM > Lab4 > Wariant3 > series-00001				
Nazwa	Data modyfikacji	Typ	Rozmiar	
image-00000.dcm	24.01.2021 10:59	GIMP 2.10.14	268 KB	
image-00001.dcm	24.01.2021 10:59	GIMP 2.10.14	270 KB	
image-00002.dcm	24.01.2021 10:59	GIMP 2.10.14	271 KB	
image-00003.dcm	24.01.2021 10:59	GIMP 2.10.14	269 KB	
image-00004.dcm	24.01.2021 10:59	GIMP 2.10.14	269 KB	
image-00005.dcm	24.01.2021 10:59	GIMP 2.10.14	269 KB	
image-00006.dcm	24.01.2021 10:59	GIMP 2.10.14	268 KB	
image-00007.dcm	24.01.2021 10:59	GIMP 2.10.14	267 KB	
image-00008.dcm	24.01.2021 10:59	GIMP 2.10.14	266 KB	
image-00009.dcm	24.01.2021 10:59	GIMP 2.10.14	264 KB	
image-00010.dcm	24.01.2021 10:59	GIMP 2.10.14	262 KB	
image-00011.dcm	24.01.2021 10:59	GIMP 2.10.14	260 KB	
image-00012.dcm	24.01.2021 10:59	GIMP 2.10.14	258 KB	
image-00013.dcm	24.01.2021 10:59	GIMP 2.10.14	255 KB	
image-00014.dcm	24.01.2021 10:59	GIMP 2.10.14	253 KB	
image-00015.dcm	24.01.2021 10:59	GIMP 2.10.14	250 KB	
image-00016.dcm	24.01.2021 10:59	GIMP 2.10.14	247 KB	
image-00017.dcm	24.01.2021 10:59	GIMP 2.10.14	243 KB	
image-00018.dcm	24.01.2021 10:59	GIMP 2.10.14	240 KB	
image-00019.dcm	24.01.2021 10:59	GIMP 2.10.14	236 KB	

3.2. Pobranie repozytoriów z GIT, wypakowanie.

imagej / imagej

Watch

<> Code 122 Issues Pull requests 1 Actions Security Insights

master 51 branches 94 tags Go to file Code

hinerm Bump to next development cycle 0667395 9 days ago 9,160 commits

.travis	Update Travis CI configuration	3 years ago
about	Add a new about image	9 years ago
bin	ImageJ.sh: remove deprecated GC options	16 months ago
config	Update the default Java platform to 1.8	5 years ago

dcm4che / dcm4che

Watch

<> Code 52 Issues Pull requests 9 Discussions Actions Projects Security Insights

master 21 branches 69 tags Go to file Code

gunterze Skipping Bulkdata fails for Sequences with undefined length and Comp... 4acc838 13 hours ago 2,760 commits

.github/ISSUE_TEMPLATE	Create config.yml	2 months ago
dcm4che-assembly	Skipping Bulkdata fails for Sequences with undefined length and Compr...	13 hours ago
dcm4che-audit-keycloak	set version: 5.23.0	2 months ago
dcm4che-audit	set version: 5.23.0	2 months ago

mputer > Win10 (C:) > maven-lab4 > Wariant3 >

Nazwa	Data modyfikacji	Typ	Rozmiar
dcm4che-master	24.01.2021 11:59	Folder plików	
imagej-master	24.01.2021 11:46	Folder plików	
series-00001	24.01.2021 11:41	Folder plików	
dcm4che-master.zip	24.01.2021 11:57	Folder skompreso...	9 272 KB
imagej-master.zip	24.01.2021 11:43	Folder skompreso...	12 691 KB

3.3. Instalacja ImageJ.

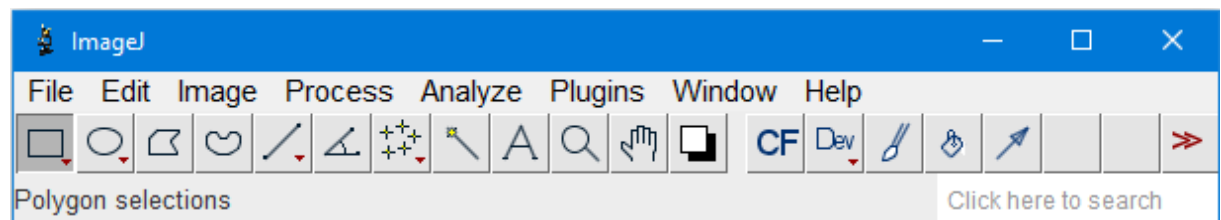
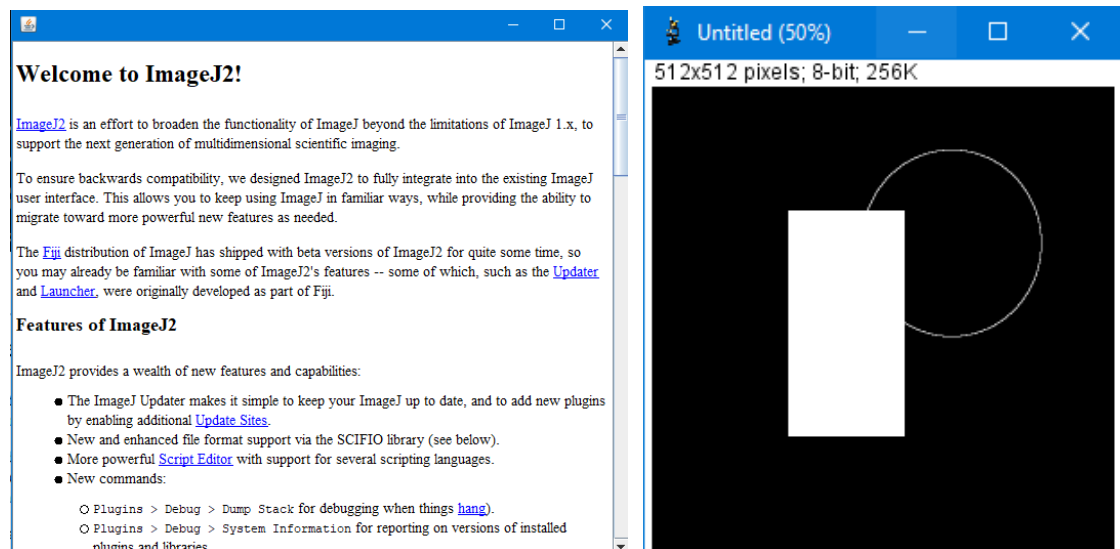
```
Wiersz polecenia - mvn
C:\maven-lab4\Wariant3\imagej-master>mvn
[INFO] Scanning for projects...
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/scijava/pom-scijava/30.0.0/pom-scijava-30.0.0.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/scijava/pom-scijava/30.0.0/pom-scijava-30.0.0.pom (170 kB at 57 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/scijava/pom-scijava-base/12.0.0/pom-scijava-base-12.0.0.pom
Downloaded from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/scijava/pom-scijava-base/12.0.0/pom-scijava-base-12.0.0.pom (67 kB at 66 kB/s)
Downloading from openmrs-repo: http://mavenrepo.openmrs.org/nexus/content/repositories/public/org/apache/maven/wagon/wagon-webdav-jackrabbit/1.0/wagon-webdav-jackrabbit-1.0.pom
Progress (1): 3.8 kB

[INFO] Installing C:\maven-lab4\Wariant3\imagej-master\target\imagej-2.2.1-SNAPSHOT-sources.jar to C:\Users\jacek\.m2\repository\net\imagej\imagej\2.2.1-SNAPSHOT\imagej-2.2.1-SNAPSHOT-sources.jar
[INFO] Installing C:\maven-lab4\Wariant3\imagej-master\target\imagej-2.2.1-SNAPSHOT-tests.jar to C:\Users\jacek\.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: 12:37 min
[INFO] Finished at: 2021-01-24T12:17:24+01:00
[INFO]
C:\maven-lab4\Wariant3\imagej-master>
```

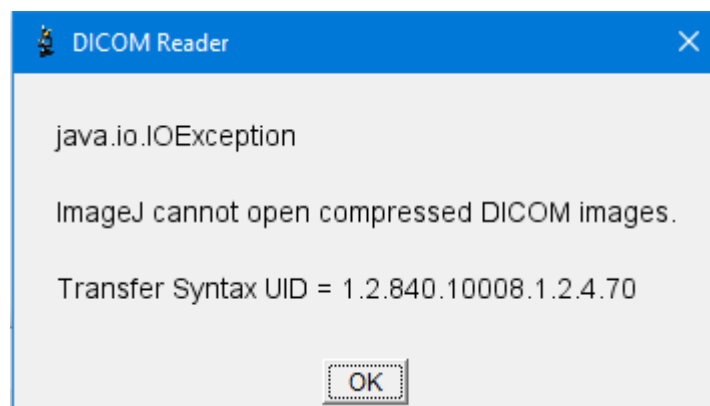
3.4. Uruchomienie ImageJ.

```
Wiersz polecenia - mvn -Pexec
C:\maven-lab4\Wariant3\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

[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.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 170 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.
```



Nie odczytuje skompresowanych plików DICOM



3.5. Instalacja dcm4che.

mvn install

```
[INFO] dcm4che-tool-xml2dcm ..... SUCCESS [ 0.247 s]
[INFO] dcm4che-tool-xml2hl7 ..... SUCCESS [ 0.173 s]
[INFO] dcm4che-assembly ..... SUCCESS [02:47 min]
[INFO] dcm4che-jboss-modules ..... SUCCESS [ 54.616 s]
[INFO] dcm4che-camel ..... SUCCESS [ 18.565 s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 16:19 min
[INFO] Finished at: 2021-01-24T12:59:34+01:00
[INFO] -----
```

Po zamianie formatu za pomocą dcm2jpg.bat

Jest w:

C:\maven-lab4\Wariant3\dcm4che-master\dcm4che-assembly\target\dcm4che-5.23.0-bin\dcm4che-5.23.0\bin>



Zamiana formatu wszystkich plików

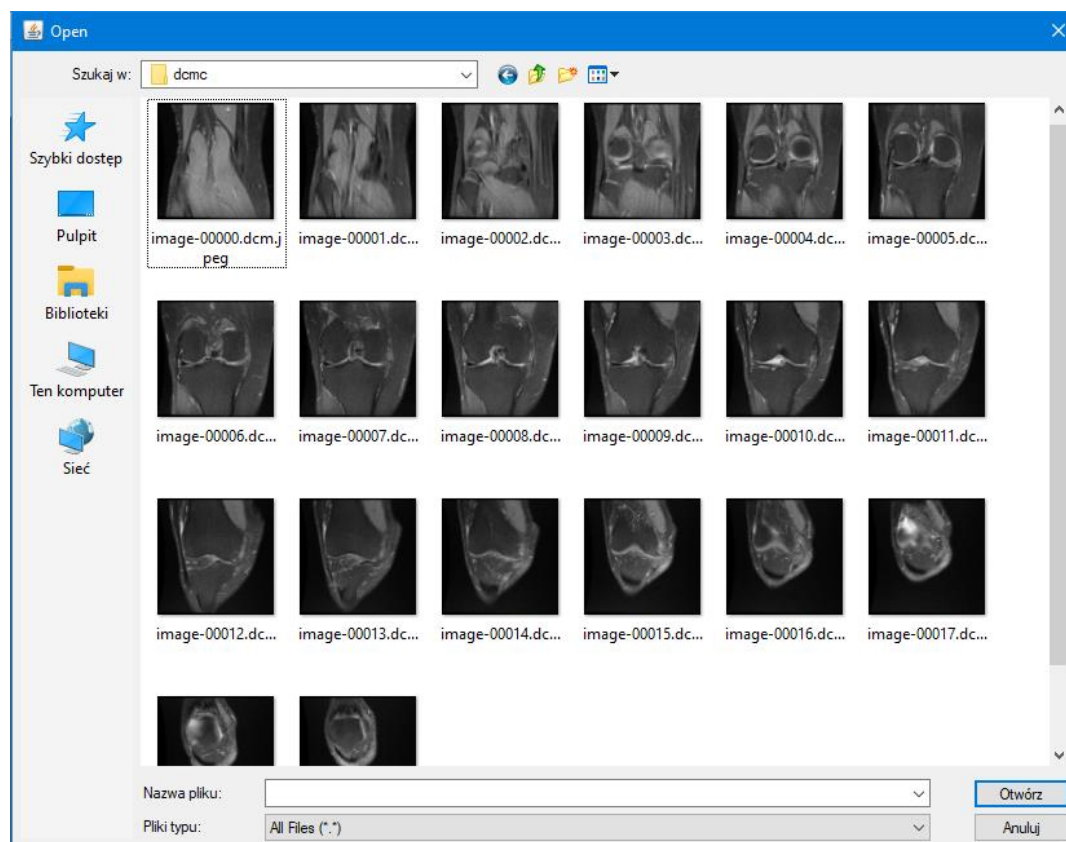
```
C:\maven-lab4\Wariant3\dc4che-master\dc4che-assembly\target\dc4che-5.23.0-bin\dc4che-5.23.0\bin>cd dcmc
C:\maven-lab4\Wariant3\dc4che-master\dc4che-assembly\target\dc4che-5.23.0-bin\dc4che-5.23.0\bin\dc4che>dir
Volume in drive C is Win10
Volume Serial Number is 4A82-ABBB

Directory of C:\maven-lab4\Wariant3\dc4che-master\dc4che-assembly\target\dc4che-5.23.0-bin\dc4che-5.23.0\bin\dc4che

24.01.2021  13:27    <DIR>          .
24.01.2021  13:27    <DIR>          ..
24.01.2021  13:27         31 610 image-00000.dcm.jpeg
24.01.2021  13:27         33 651 image-00001.dcm.jpeg
24.01.2021  13:27         35 206 image-00002.dcm.jpeg
24.01.2021  13:27         37 348 image-00003.dcm.jpeg
24.01.2021  13:27         36 462 image-00004.dcm.jpeg
24.01.2021  13:27         34 877 image-00005.dcm.jpeg
24.01.2021  13:27         34 683 image-00006.dcm.jpeg
24.01.2021  13:27         33 740 image-00007.dcm.jpeg
24.01.2021  13:27         34 632 image-00008.dcm.jpeg
24.01.2021  13:27         33 625 image-00009.dcm.jpeg
24.01.2021  13:27         32 204 image-00010.dcm.jpeg
24.01.2021  13:27         32 436 image-00011.dcm.jpeg
24.01.2021  13:27         28 457 image-00012.dcm.jpeg
24.01.2021  13:27         26 834 image-00013.dcm.jpeg
24.01.2021  13:27         26 020 image-00014.dcm.jpeg
24.01.2021  13:27         27 684 image-00015.dcm.jpeg
24.01.2021  13:27         24 378 image-00016.dcm.jpeg
24.01.2021  13:27         24 637 image-00017.dcm.jpeg
24.01.2021  13:27         23 780 image-00018.dcm.jpeg
24.01.2021  13:27         24 191 image-00019.dcm.jpeg
                20 File(s)              616 455 bytes
                2 Dir(s)          48 476 753 920 bytes free

C:\maven-lab4\Wariant3\dc4che-master\dc4che-assembly\target\dc4che-5.23.0-bin\dc4che-5.23.0\bin\dc4che>
```

Teraz przeglądarka widzi pliki *.jpeg prawidłowo. (źle utworzone rozszerzenie – ale to nie przeszkadza przy odczycie plików).



Plik wczytany do ImageJ



Zamiana na *.dcm nieskompresowany (za pomocą ddc2dcm)

```
Directory of C:\maven-lab4\Wariant3\dc4che-master\dc4che-assembly\target\dc4che-5.23.0-bin\dc4che-5.23.0\bin\dc2
24.01.2021 13:36 <DIR>      .
24.01.2021 13:36 <DIR>      ..
24.01.2021 13:36          526 576 image-00000.dcm
24.01.2021 13:36          526 580 image-00001.dcm
24.01.2021 13:36          526 578 image-00002.dcm
24.01.2021 13:36          526 578 image-00003.dcm
24.01.2021 13:36          526 578 image-00004.dcm
24.01.2021 13:36          526 576 image-00005.dcm
24.01.2021 13:36          526 576 image-00006.dcm
24.01.2021 13:36          526 574 image-00007.dcm
24.01.2021 13:36          526 578 image-00008.dcm
24.01.2021 13:36          526 576 image-00009.dcm
24.01.2021 13:36          526 576 image-00010.dcm
24.01.2021 13:36          526 576 image-00011.dcm
24.01.2021 13:36          526 580 image-00012.dcm
24.01.2021 13:36          526 578 image-00013.dcm
24.01.2021 13:36          526 578 image-00014.dcm
24.01.2021 13:36          526 578 image-00015.dcm
24.01.2021 13:36          526 578 image-00016.dcm
24.01.2021 13:36          526 576 image-00017.dcm
24.01.2021 13:36          526 576 image-00018.dcm
24.01.2021 13:36          526 576 image-00019.dcm
                20 File(s)      10 531 542 bytes
                2 Dir(s)    48 469 540 864 bytes free
C:\maven-lab4\Wariant3\dc4che-master\dc4che-assembly\target\dc4che-5.23.0-bin\dc4che-5.23.0\bin\dc2>
```

Szukaj w:	dc2			
Nazwa	Data modyfikacji	Typ	Rozmiar	
image-00000.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00001.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00002.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00003.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00004.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00005.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00006.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00007.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	
image-00008.dcm	24.01.2021 13:36	GIMP 2.10.14	515 KB	

Przeglądarka widzi pliki *.dcm.



4. Wnioski:

Przeglądanie skompresowanych plików *.dcm możliwe jest po ich przekształceniu do formatów akceptowanych przez ImageJ. Można to zrobić poleceniami wierszowymi z „dcm4che”. „dcm2dcm.bat” przekształca na format *.dcm nieskompresowany a „dcm2jpg.bat” na format *.jpeg.

End Lab