ATi - 3D

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Model

- Creates TIFF database folder and compiles converted DICOM images
- Coded in Matlab because it is free for all NAU students
- Small snip of conversion code is viewable to the right

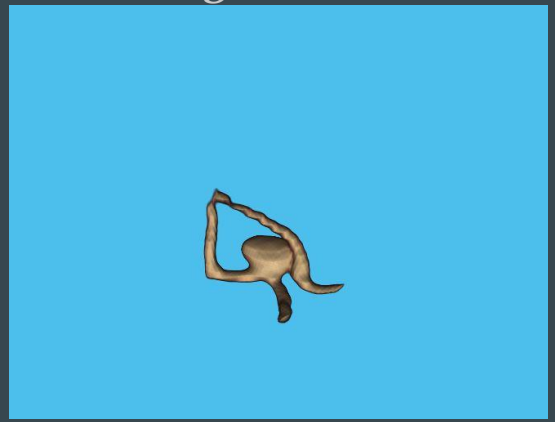
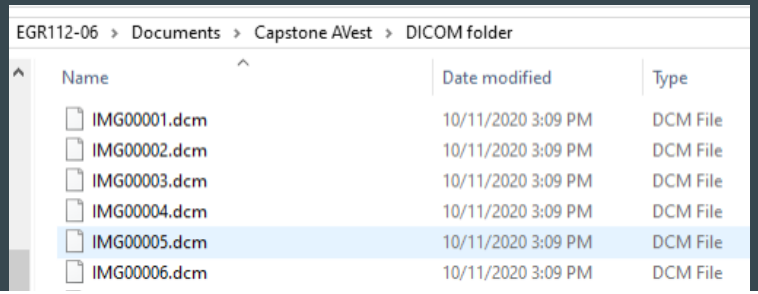
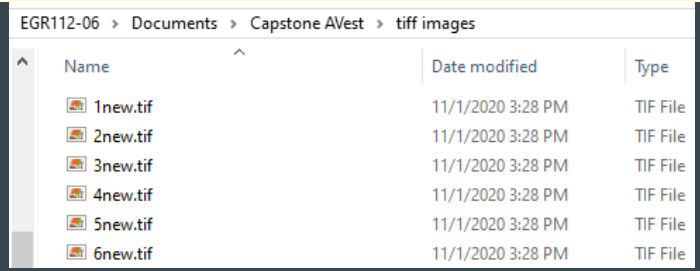


Figure 4: vessel defect in Volume viewer

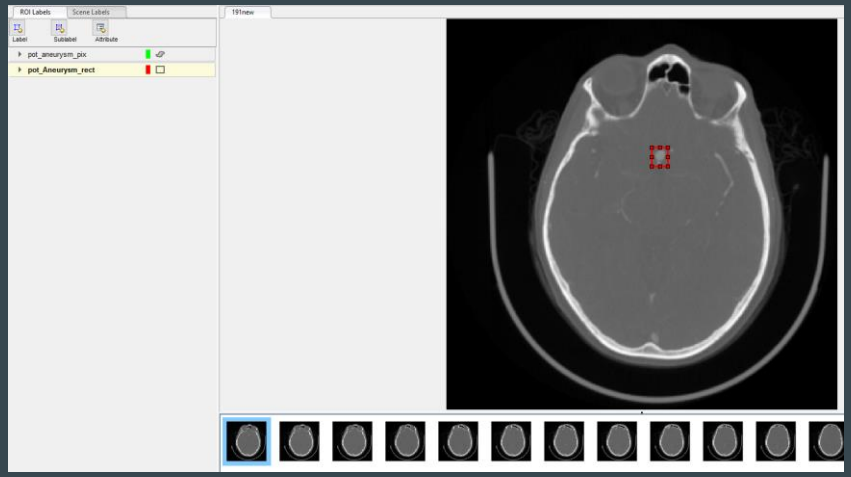


```
%% convert all files in that folder
for i=1:260

%filenameee=preI(i);  Z:\Documents\Capstone AVest\DICOM folder
allfiles=fullfile('Z:\','Documents','Capstone AVest','DICOM folder',fileNames);
preI(i)=allfiles(i)
location=char(preI(i))
I=dicomread(location);
 imwrite(I, sprintf('%dnewish.png',i));%'brain(20).tif');

end
```



Figures 1-3: DICOM to TIFF Conversion

Design Description



Figures 5-6: Image labeler

Can be split into three functions:

- Format and compile DICOM files into TIFF files
- Trained R-CNN Scans files for aneurysm
- If an aneurysm is found, Volume is calculated

Multiple parts streamline processes and help eliminate errors.

GUI

- Created using Visual Studio C# (.NET) Application
  - Simple easy to use interface
- MATLAB code to be compiled using MATLAB Compiler SDK
  - This will allow the the code to be packaged as a .Net assembly file
- Progress bar and estimated time remaining

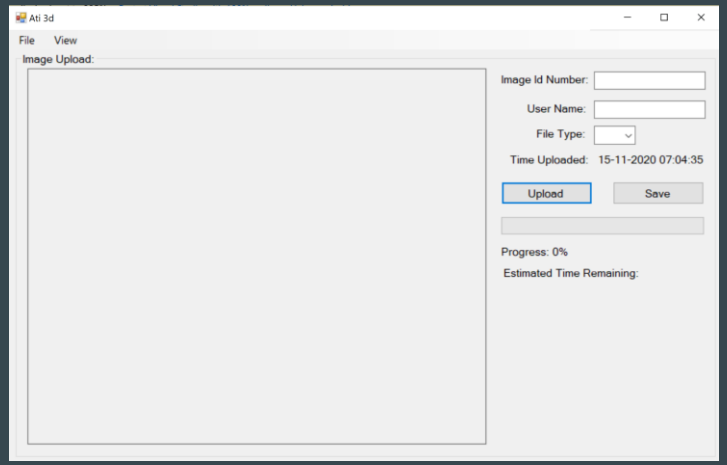


Figure 7: GUI for program

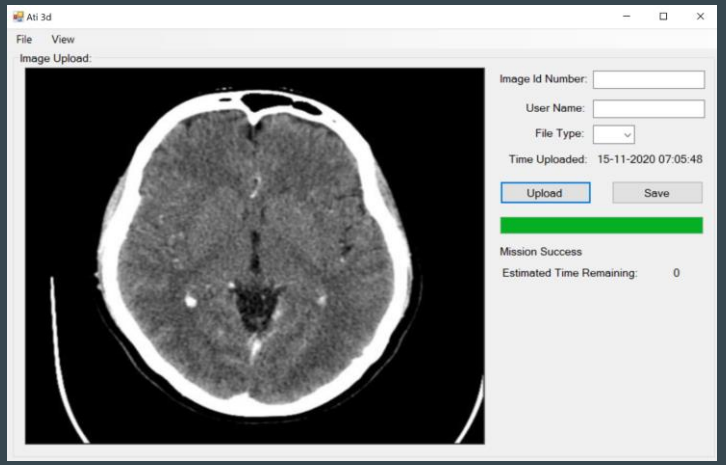


Figure 8: Viewing a slice in GUI

Customer and Engineering Requirements

- CRs
  - Cost within Budget
  - Reliable and Versatile Program
  - Input DICOM files
  - Output 3D Visual, Location, and Measurements
  - User Friendly for all Medical Professionals
- ERs
  - Volume
  - Location
  - Time
  - Accuracy
  - Reliability

Changes from Preliminary

- DICOM to Tiff Converter for ease of use throughout program.
- R-CNN was chosen as Neural Network for Object Detection

Figure 9: TIFF file extension [1]

Design Validation and Testing

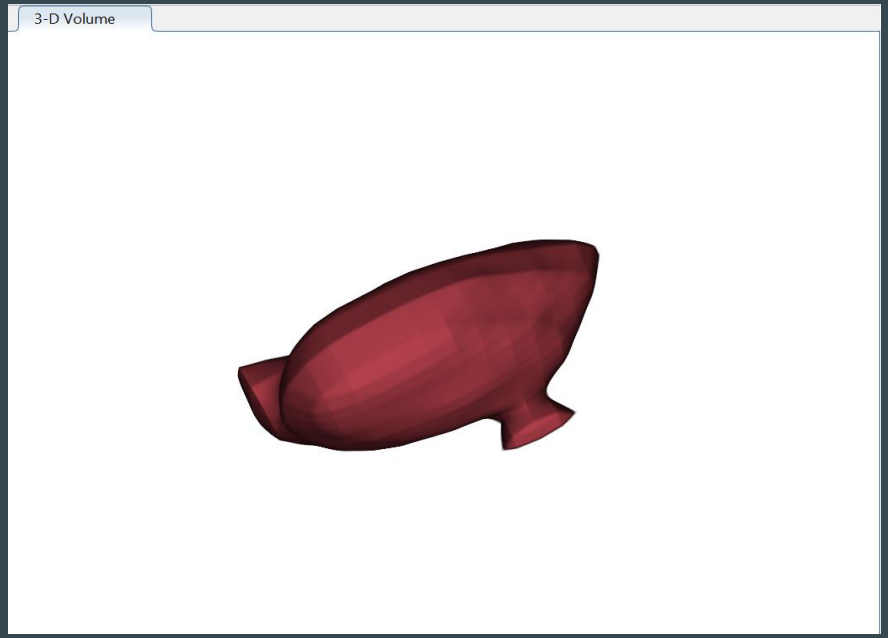


Figure 10: Aneurysm as seen in Volume viewer

- Testing for creation of image database has been completed
- Training data
  - Find samples with known aneurysms
- Use volume viewer to compare known volumes with program calculated volumes

Plan

- Approximate cost: $0
- Hope to complete in march

WBS	Task	Start	End	Days	% Done
1	Complete CNN	Tue 12/01/20	Fri 1/01/21	31	
1.1	Gather training data	Tue 12/01/20	Wed 12/16/20	15	33%
1.2	Find a CNN in MatLab	Tue 12/01/20	Tue 12/08/20	7	50%
1.3	Program the CNN using data	Tue 12/08/20	Wed 12/16/20	7	66%
1.4	Test CNN	Wed 12/16/20	Wed 12/23/20	7	83%
1.5	Refine CNN based on tests	Thu 12/24/20	Fri 1/01/21	7	100%
1.6					
2	Volume calculator			29	
2.1	Program calculator	Fri 1/01/21	Sat 1/16/21	15	50%
2.2	Test calculator	Sun 1/17/21	Sun 1/24/21	7	75%
2.3	Refine based on tests	Sun 1/24/21	Sun 1/31/21	7	100%
2.4					
2.5					
2.6					
3	Combine codes			1	
3.1	Link Tiff with CNN	Mon 2/01/21	Mon 2/08/21	7	25%
3.2	Link CNN with volume calc	Mon 2/08/21	Mon 2/15/21	7	50%
3.3	Link Matlab with GUI	Mon 2/15/21	Mon 2/22/21	7	75%
3.4	Test program after linking	Mon 2/22/21	Mon 3/01/21	7	100%
3.5					

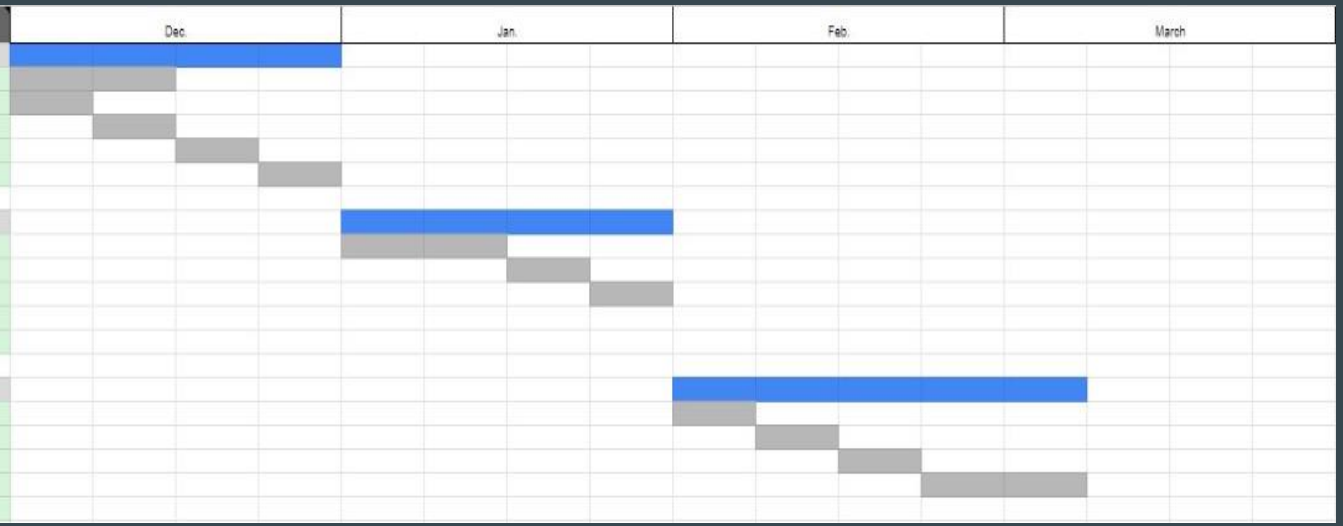


Figure 11: Gantt Chart

References

[1]Arman, “Arman,” Online file conversion blog, 11-Feb-2019. [Online]. Available: https://blog.online-convert.com/the-end-of-tiff/. [Accessed: 14-Nov-2020].