

RadXperiments Proposed Budget & Milestones

Robert Toth, Ph.D. & Nathan Hillyer

2021-02-05

Past Milestones - \$50k

Collage (Nathan) - \$25k

- ~~1. [\$5k] Port code/algorithm to python.~~
- ~~2. [\$5k] Create open source plugin for Slicer 3D software.~~
- ~~3. [\$2k] Incorporate feedback from clinical partners.~~
- ~~4. [\$5k] Create plugin for Brainlab.~~
- ~~5. [\$6k] Create prototype of cloud based WebApp.~~
- ~~6. [\$2k] Misc (e.g. travel, software licenses, server costs).~~

Morphology (Nesh) - \$25k

- Morph-1.** ~~[\$5k] Local topology features:~~
- ~~a. Port existing matlab algorithm for calculating local topology features into python.~~
 - ~~b. Create Jupyter notebook and docker image for easy use by developers~~
- Morph-2.** [\$5k] Atlas Deformation Field
- a. Port existing matlab algorithm for calculating deformation features into python
 - b. Create Jupyter notebook and docker image for easy use by developers
- Morph-3.** ~~[\$5k] Radpath Fusion~~
- ~~a. Port existing C++ code to python~~
 - ~~b. Allow user to select paired landmarks~~
 - ~~c. Perform non rigid registration between paired landmarks~~
 - ~~d. Display results in Jupyter notebook~~
- Morph-4.** [\$5k] Feature Analysis
- a. Quantify feature stability across datasets
 - b. Qualitatively visualize feature values and statistics for discriminability
 - c. Create interactive Jupyter notebook
- Morph-5.** [\$2k] Code maintenance
- ~~a. Allowing participants to report issues on public github repository~~
 - b. Addressing bugs/issues during length of contract

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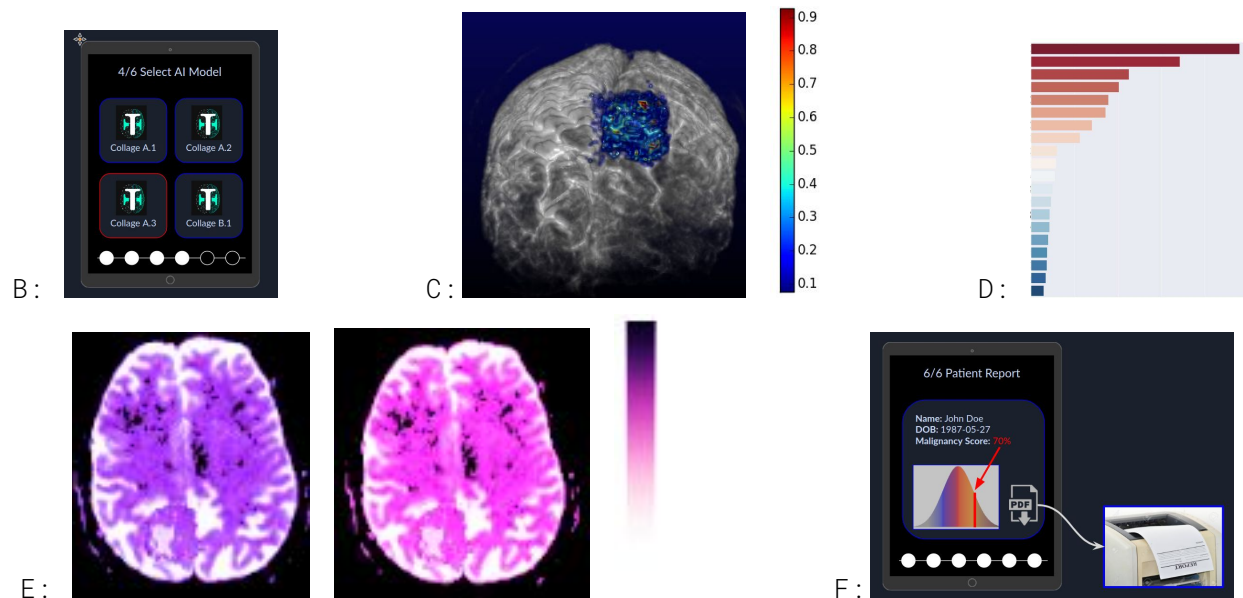
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New Proposed Milestones - \$24k

Milestone #7: Clinical View - \$11K

- A. [\$2k] Integrate pip package and select mask
- B. [\$2k] Select trained AI
- C. [\$2k] View probability heatmap
- D. [\$2k] View feature importance
- E. [\$2k] View collage texture expressions (colorbar different from 8C)
- F. [\$1k] View & download (as PDF) patient report



Milestone #8: Plugins & Integration - \$8K

- G. [\$3k] Topology Slicer Plugin
- H. [\$3k] Deformation Field Slicer Plugin
- I. [\$2k] Platform Integration (e.g., Stanford QIFP) & Maintenance

Milestone #9: Quality Control - \$5K

- J. [\$1k] Add QC tab & upload image in webapp.
- K. [\$3k] Integration with trained QC model.
- L. [\$1k] Display quality control scores / results.

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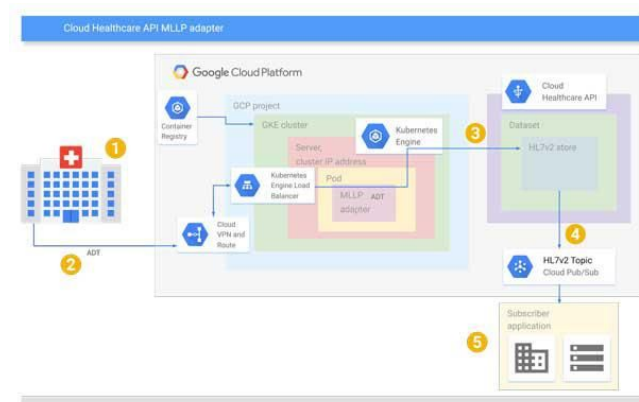
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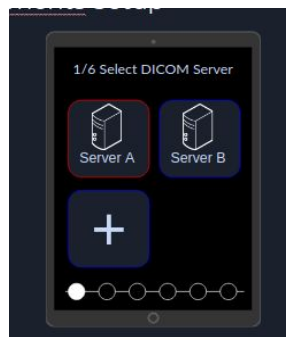
Future Milestones - \$28k

Milestone #10: Data Infrastructure - \$10k

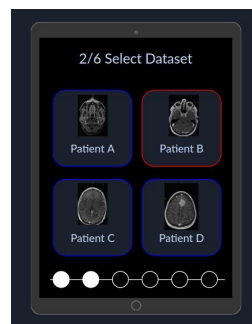
- A. [\$1k] Use google cloud healthcare DICOM for HIPAA-compliant storage
- B. [\$2k] Connect webapp with DICOM server(s)
- C. [\$1k] Upload new data
- D. [\$1k] Load datasets
- E. [\$3k] Integrate OHIF Viewer as tab



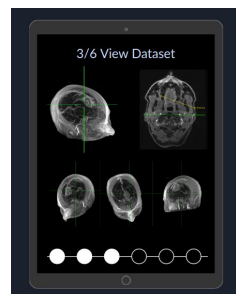
A:



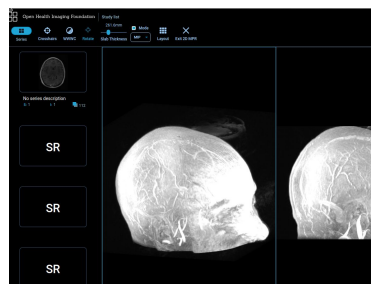
B:



D:



E:



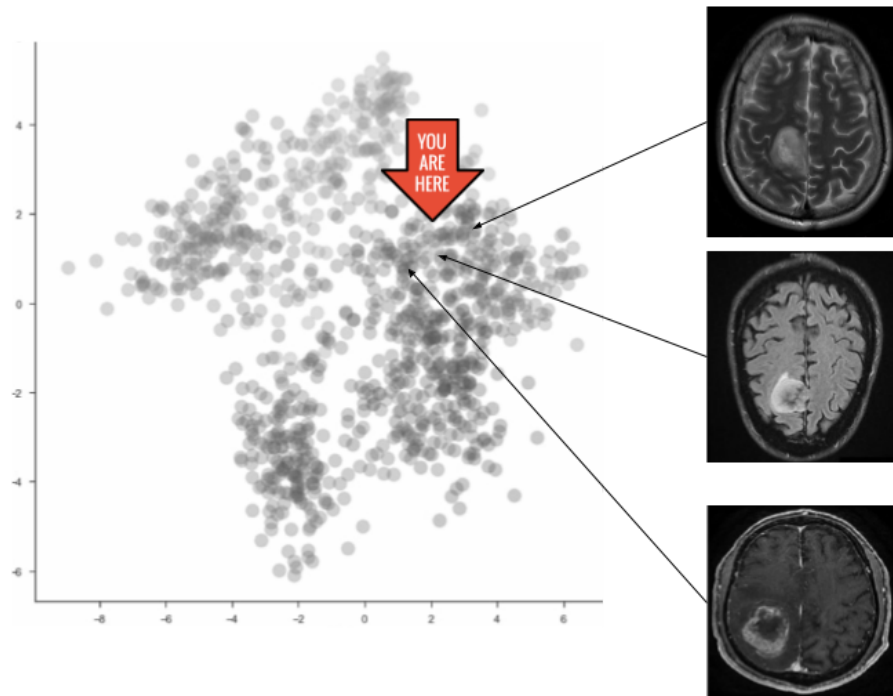
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Milestone #11: CBIR - \$5K

- A. [\$1k] Add CBIR tab
- B. [\$3k] Integrate autoencoder+[TSNE/UMAP] (CBIR)
- C. [\$1k] View similar brain MRI lesion



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Milestone #12: Researcher View - \$13k

- A. [\$2k] Load internal training data
- B. [\$2k] Load public training data (e.g. TCIA)
- C. [\$2k] Let user tinker with classifier parameters
- D. [\$3k] Run cross validation
- E. [\$2k] View results statistics (e.g. AUC, PPV)
- F. [\$2k] Reload old experiments / results and push to *Clinical View*

(AI webapp I made for another client with training results:)

Accuracy:

Sensitivity = $TP/(TP+FN)$ = Of all the images a person said had a logo, what % did the AI get correct?

Specificity = $TN/(TN+FP)$ = Of all the images a person said had no logo, what % did the AI get correct?

PPV = $TP/(TP+FP)$ = Of all the images the AI said had the logo, what % did it get correct?

NPV = $TN/(TN+FN)$ = Of all the images the AI said had no logo, what % did it get correct?

Accuracy = $(TP+TN)/(TP+TN+FP+FN)$ = Of all the images the AI scored, what % did it get correct?

	TP	TN	FP	FN	Sensitivity	Specificity	PPV	NPV	Accuracy
Σ :	968	45335	876	180	84.3%	98.1%	52.5%	99.6%	97.8%
Training Cycle #18:	668	27350	201	145	82.2%	99.3%	76.9%	99.5%	98.8%
Training Cycle #17:	214	7874	93	15	93.4%	98.8%	69.7%	99.8%	98.7%
Training Cycle #16:	8	798	11		100.0%	98.6%	42.1%	100.0%	98.7%