



Tomographic Medical Image Reconstruction Using Deep Learning

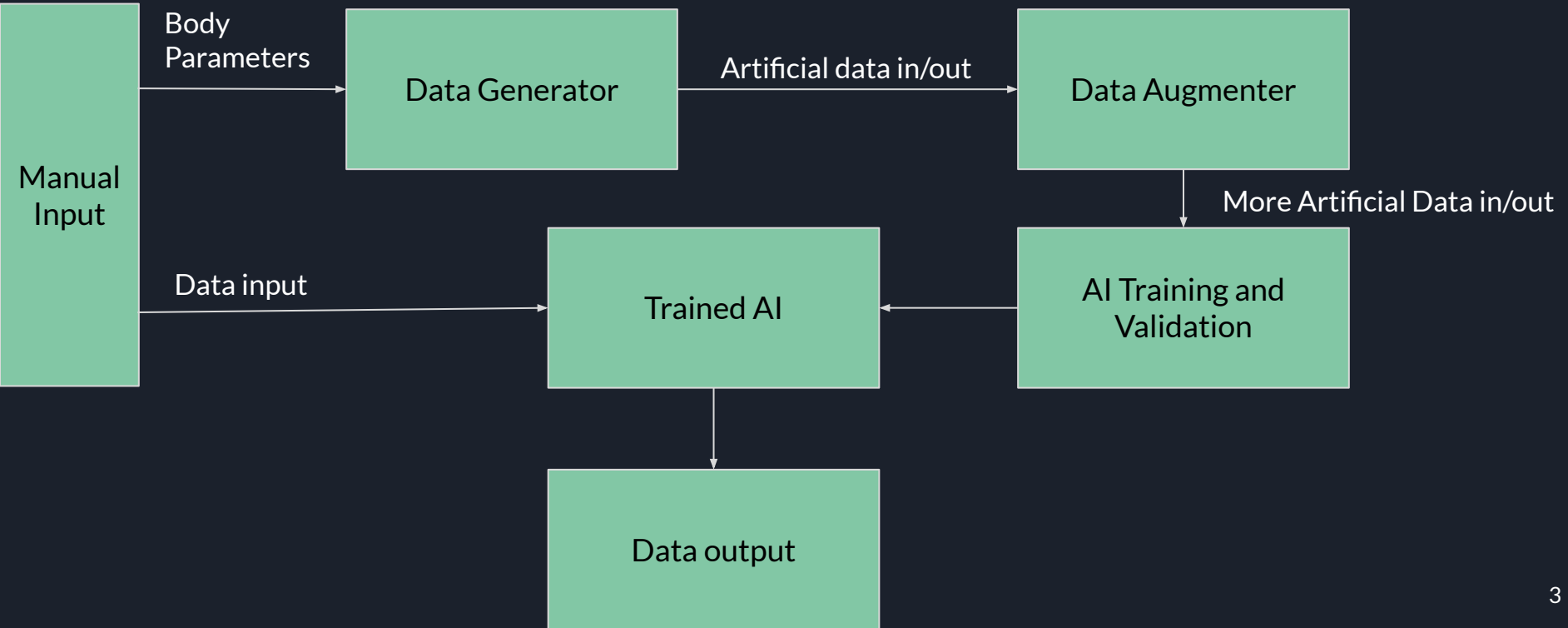
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Advised by Dr. Debasis Mitra




Task Matrix for Milestone 5

Task Matrix for Milestone 5	Completion	Asher	Chris	Ty
Generate 5,000 sinograms using the model pipeline	80%	10%	30%	60%
Continue to optimize training time in AI Panther	50%	90%	10%	0%
Create project poster	80%	20%	60%	20%
Test the AI on real medical data	50%	45%	45%	10%

Design





Generate 5,000 sinograms using the model pipeline

- Unfortunately, we were unable to reach this goal because our data generation script encountered an error over spring break.
- We also focused on creating unaugmented test data for the AI, instead of the training data.
- We currently have about 3,825 sinograms.



Continue to optimize training time in AI Panther

- We were able to reduce the AI.Panther training time from 12 hours to 1 hour 40 minutes, or by about 90%. To do this, we:
 - Enabled GPU acceleration,
 - Distributed computing resources across multiple GPUs.




Create Project Poster

- All three lab members were able to contribute to the project poster.
- We will continue to fine-tune the poster as needed based on suggestions from our advisor and changes in the project over the next month.



Test the AI on real medical data

- Using Dr. Chan's suggestions, we created a composite evaluation metric combining all of our training metrics.
- Using our composite metric, we have determined which model has the best performance (SSIM).
- We will focus on fine-tuning our selected model before the Senior Design Showcase.
- Results on next slide



Video Demo (Expected vs Actual Result Example With RMSE Loss function)

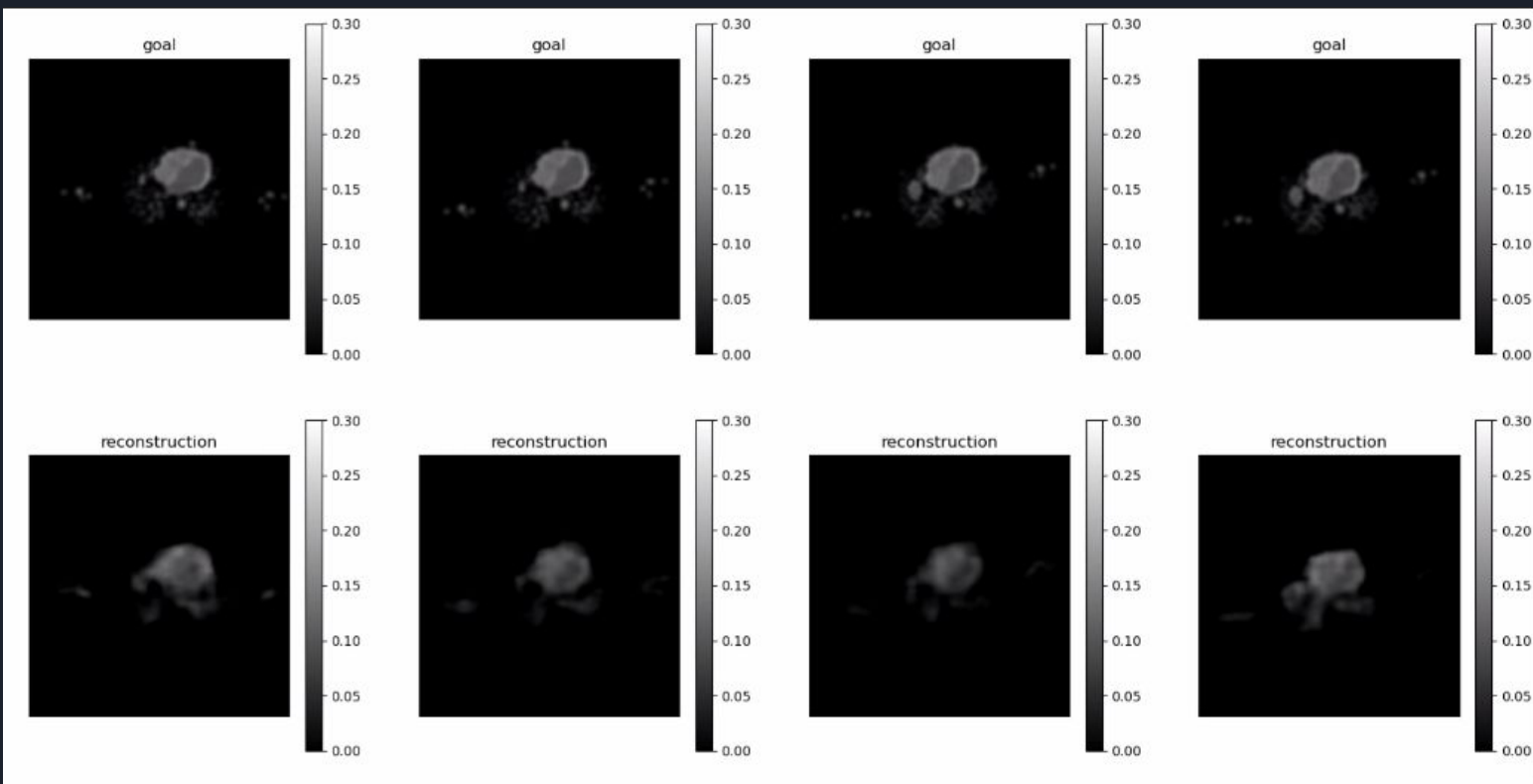
Test with augmented test data:

<https://youtu.be/DSLVTyYOfBY>

Test with unaugmented test data:

<https://youtu.be/uONcGzMe92Y>

Results with SSIM Loss (not including difference)





Test the AI on real medical data

- The results are very different from the expected output
 - Likely due to differences between training and test data
- Based on advisor feedback we will be focusing on improvements on the model with synthetic data reconstruction



Task Matrix for Milestone 6

Task Matrix for Milestone 6	Asher	Chris	Ty
Continue to optimize training time in AI Panther	35%	35%	30%
Identify best AI parameters and keep them as our final product	80%	10%	10%
Create user/developer manual	33%	33%	33%
Test the AI on unaugmented synthetic data	40%	40%	20%



Questions?