

# Cartesian Genetic Programming for Image Segmentation

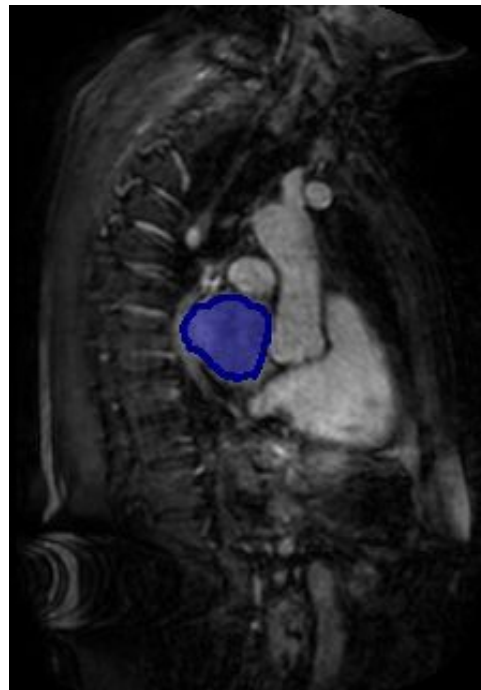
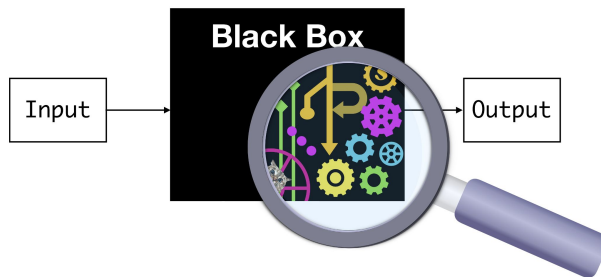
CGP-Image Segmentation - G1F

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# Problem: Image Segmentation

Current Solution: Deep Neural Networks

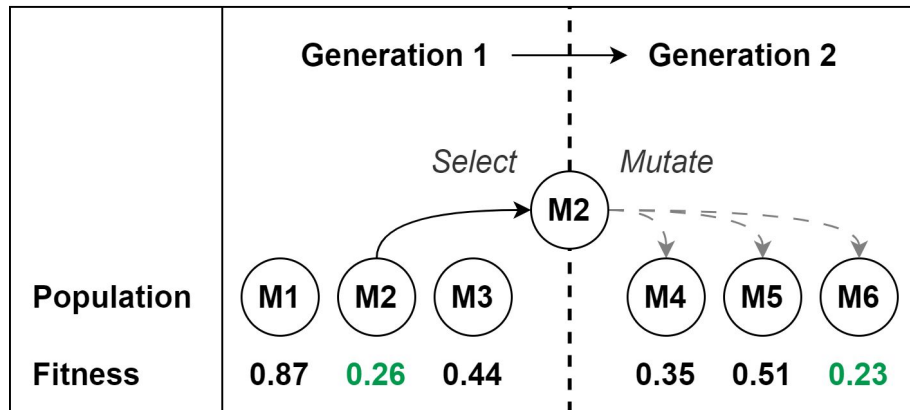
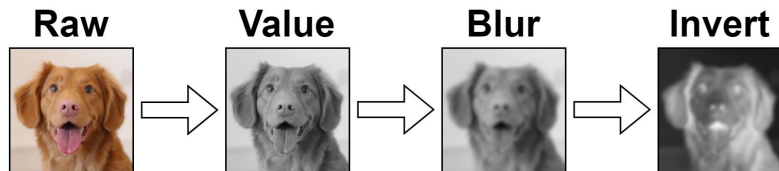
- + performs well
- large dataset required
- not human interpretable





# Proposed Solution

**Kartezio**: a modular Cartesian **Genetic Programming** framework that generates fully transparent and easily interpretable **image processing pipelines**.

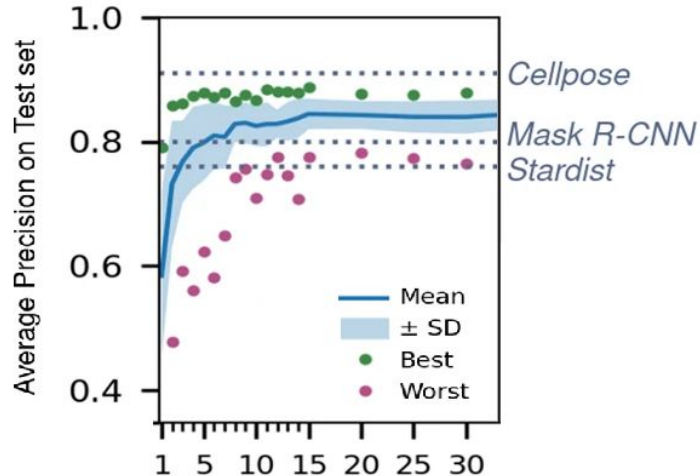
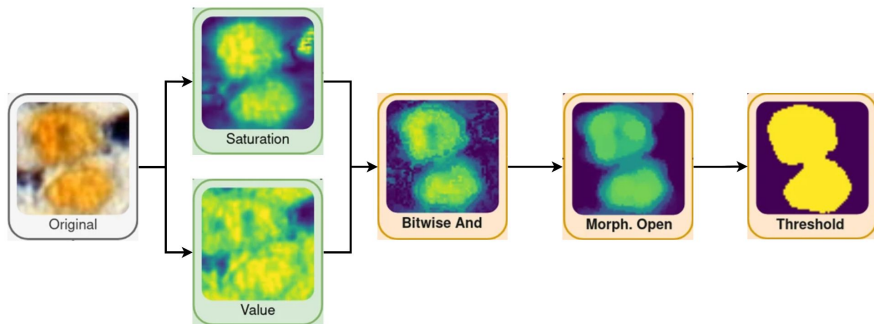




# Project Goal

Test Kartezio's claims:

- + trained on small datasets
- + comparable performance
- + transparent and interpretable







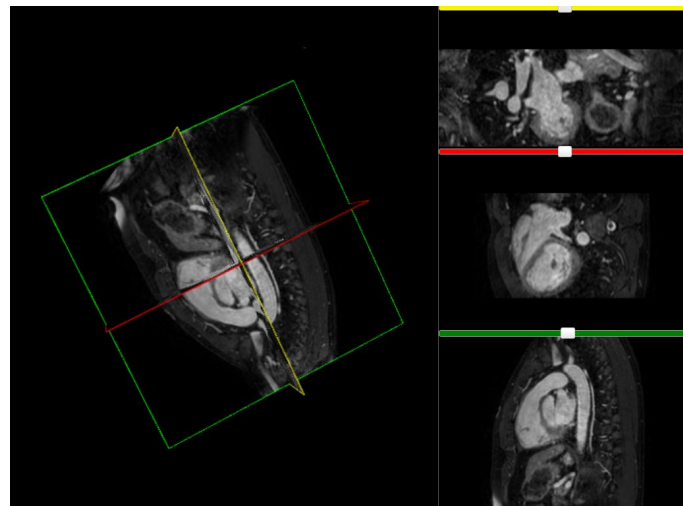


# Dataset

## Medical Segmentation Decathlon

20 MRI scan of heart

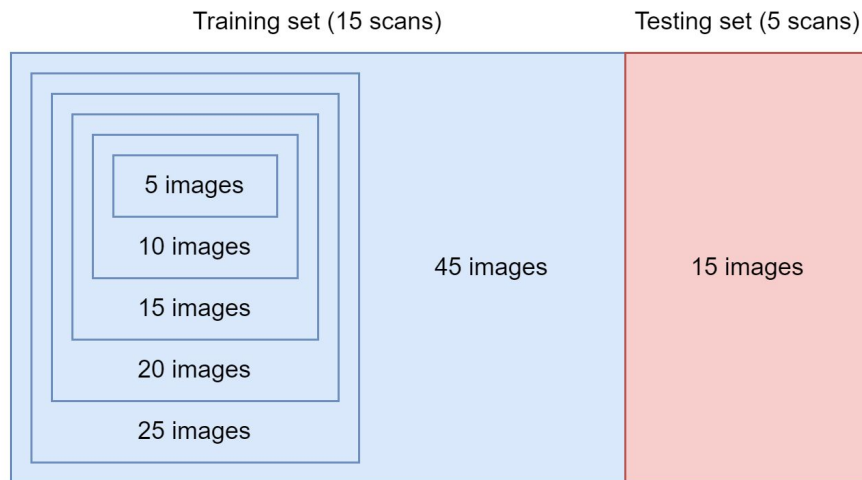
|  | Heart   |
|---|---|
|  | MRI   |
|  | 30 3D volumes                                 |
|  | Small training dataset with large variability |





# Experiment

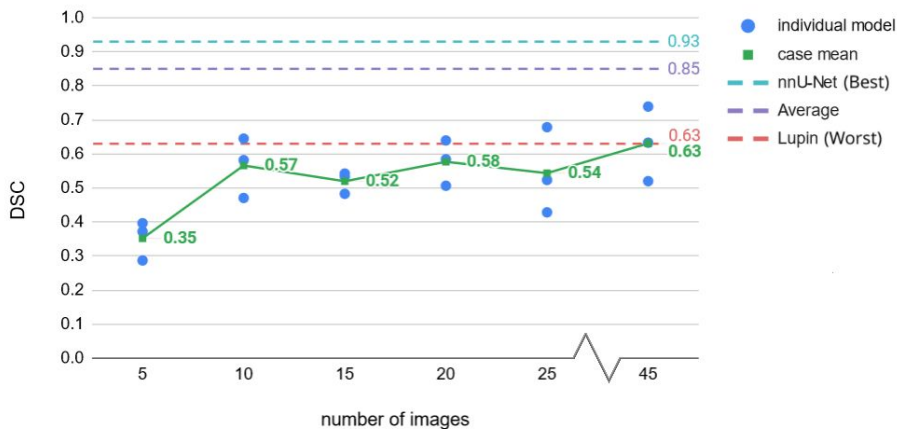
- multiple models
- different train set sizes
- evaluate on same test set



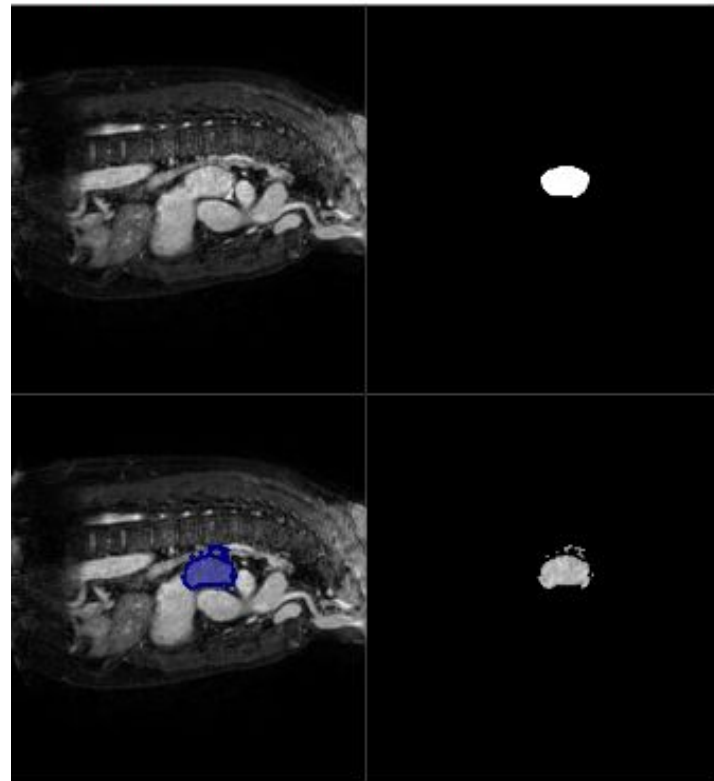
# Results

- good performance with small sizes
- stable after 10 images

DSC Scores on Test Set



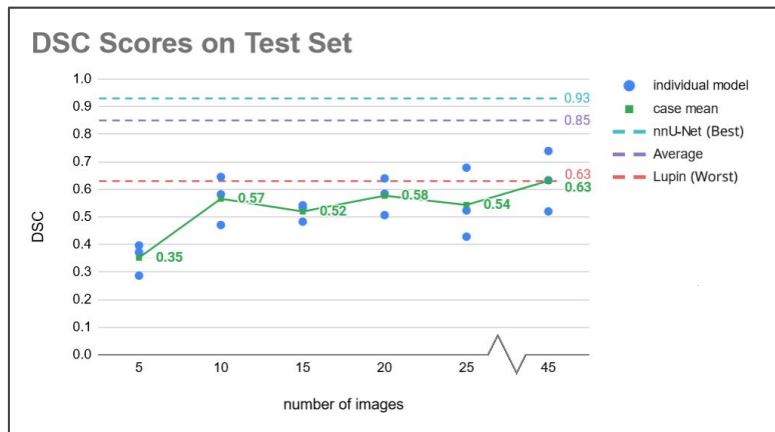
Original data



Prediction

# Conclusion & Discussion

- ✓ optimal performance on small dataset
- ~ moderate performance compared to others
- ~ semi-humanly interpretable representation



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**Questions?**