

Constrained Harmonization Algorithm for Pooling Multi-site Datasets



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- **Background**
- Method
- Algorithm
- Results
- Conclusions

Background

Naive Pooling



Scanner: SIEMENS



Scanner: GE

CREDITS: CLIFF JACK

Methods

→ **Study 1: Site Pooling**

→ **Study 2: Scanner Pooling**

Methods: Site Pooling

ADRC vs DZNE

Wisconsin Alzheimer's Disease Research Center (ADRC)

German Center for Neurodegenerative Diseases (DZNE)

- Summaries from Freesurfer processed T1-weighted images
- Two layer neural network classifier

Methods: Scanner Pooling

Controlling Scanner Confounds - ADNI Dataset

GE

Siemens

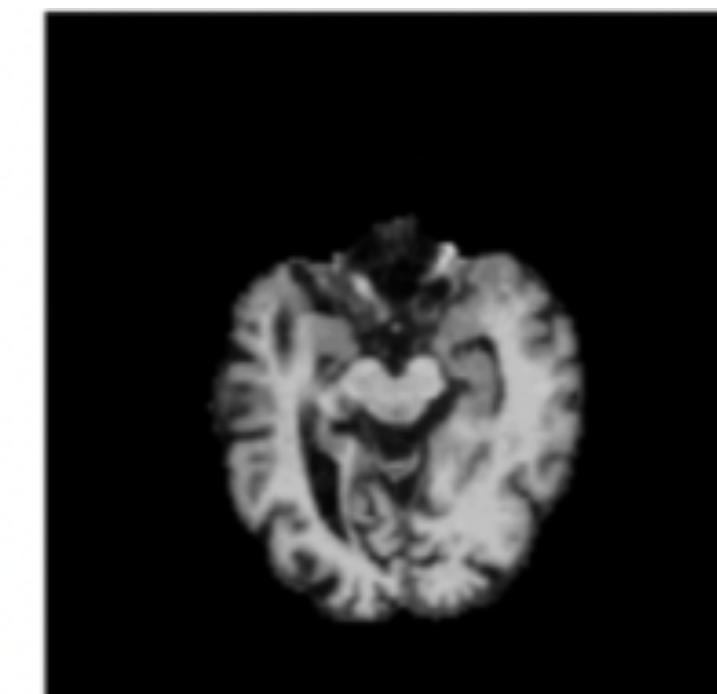
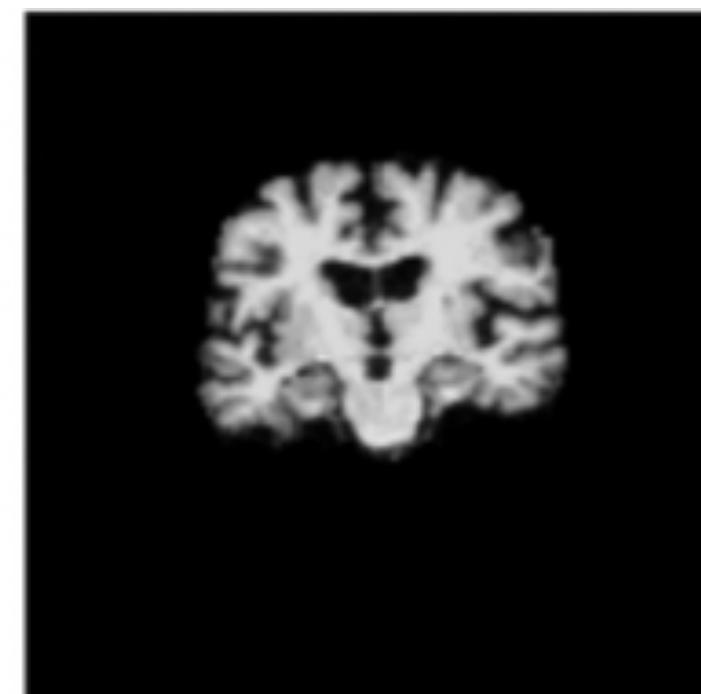
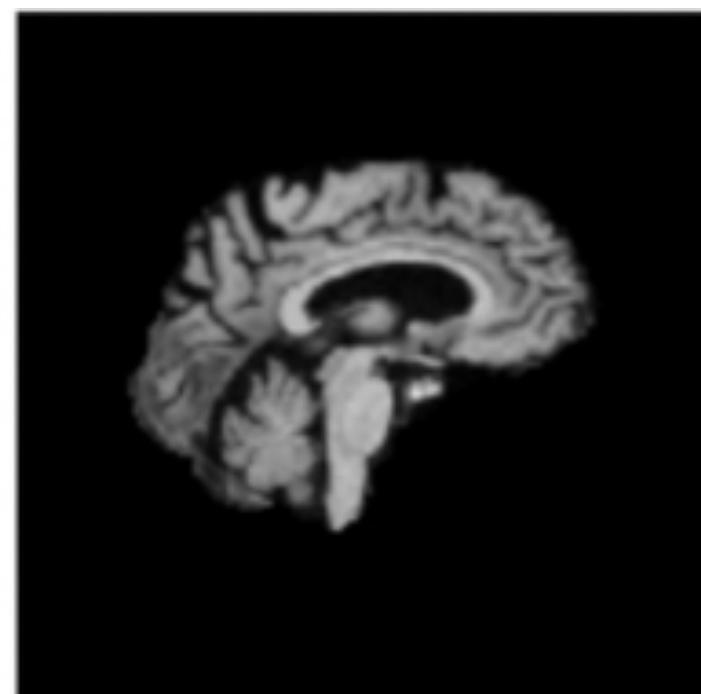
Philips

- Freesurfer processed MR images
- Deep 3D Convolutional Network

Methods: Preprocessing Steps

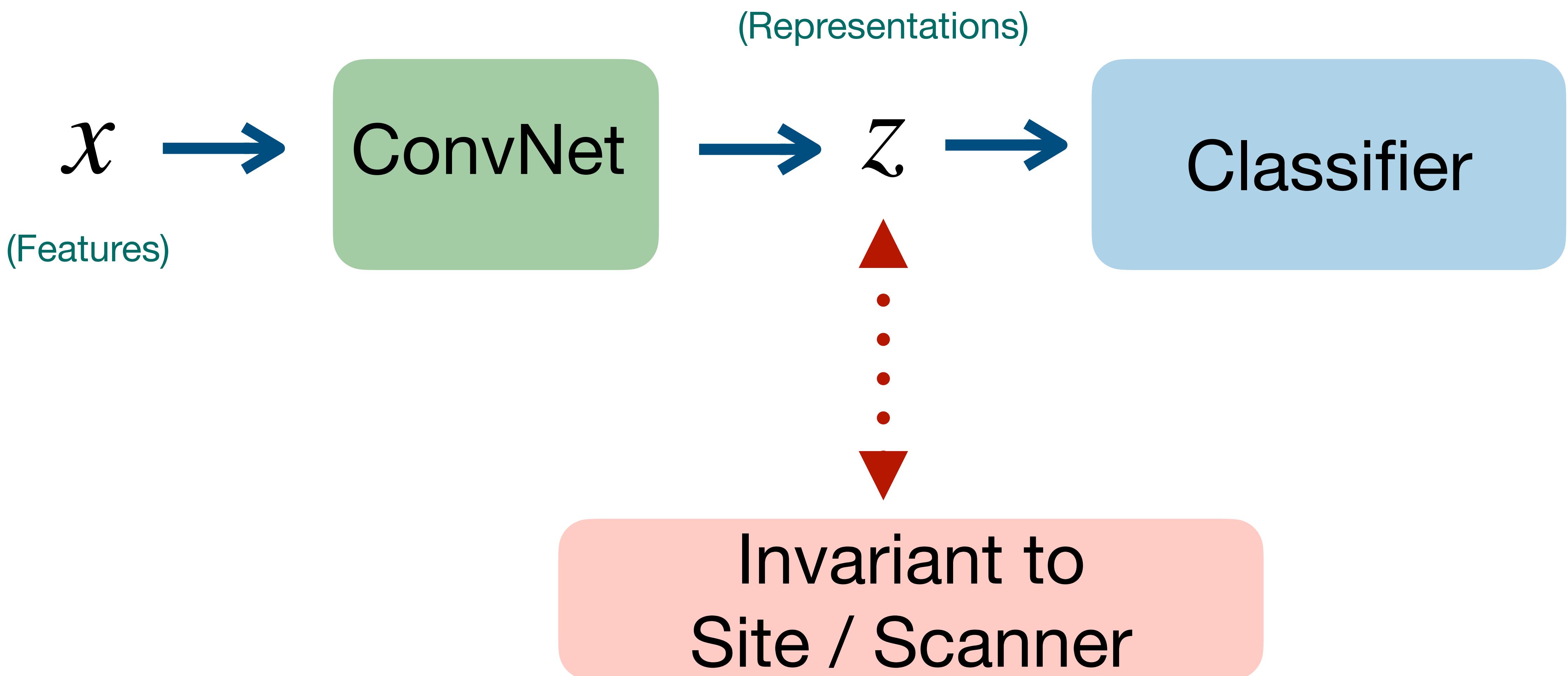
Scanner-Pooling

- **Skull stripping, intensity normalization, and Linear Image Registration to MNI152_T1_2mm_brain**



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Algorithm

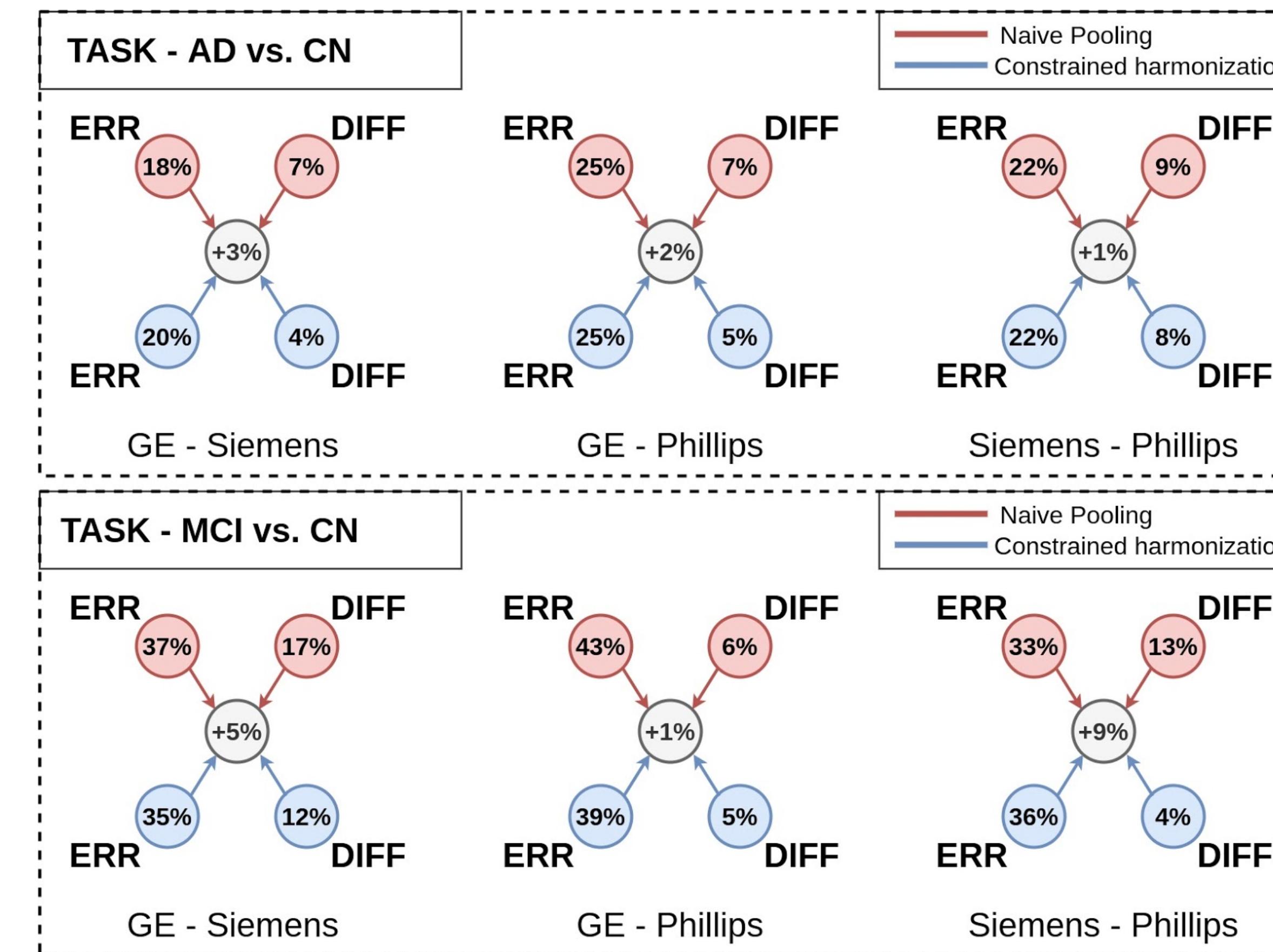


Algorithm

Train Loss + $\lambda(\text{Diff of Losses})^2$

Results: Scanner Pooling

Controlling Scanner Confounds - ADNI Dataset



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Conclusions

- Harmonized constraint based algorithm to mitigate site specific differences
- Harmonization by constraining the classifier and not by modifying the data

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<https://github.com/lokhande-vishnu/MultisitePooling>