Overview of Scanner Invariant Representations: Moyer et al. 2020, *Magn. Reson. Med.*

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MIDL 2020

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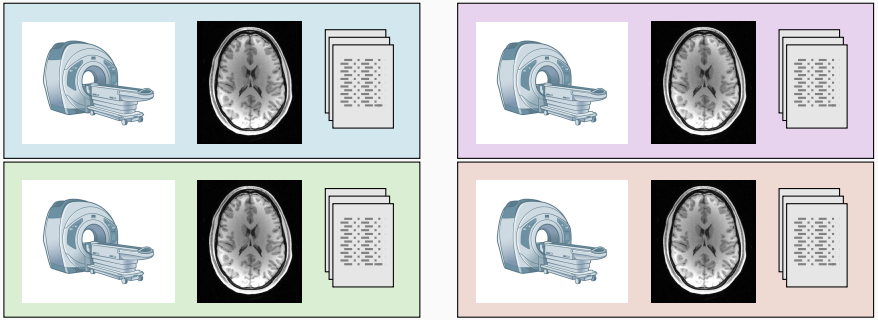
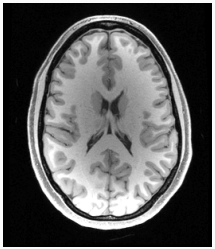
The Scanner Problem

Multi-site analyses have varying site signals.



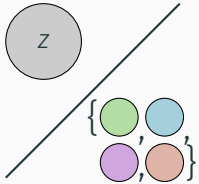
Site signals don’t generalize.

The Scanner Problem



Data x

$q(z|x) \perp s$

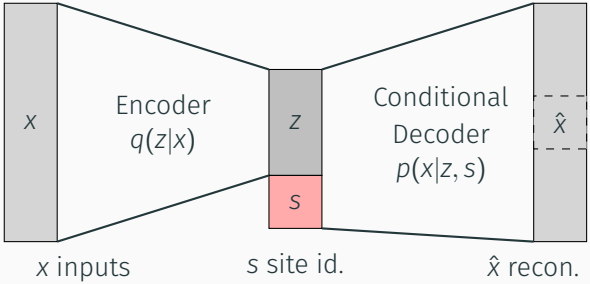


Latent factors z such that $z \perp s$

Inv Representation

1. Remove just the info about s from x.
2. Then free to use z without s-bias.

Conditional Auto Encoder:

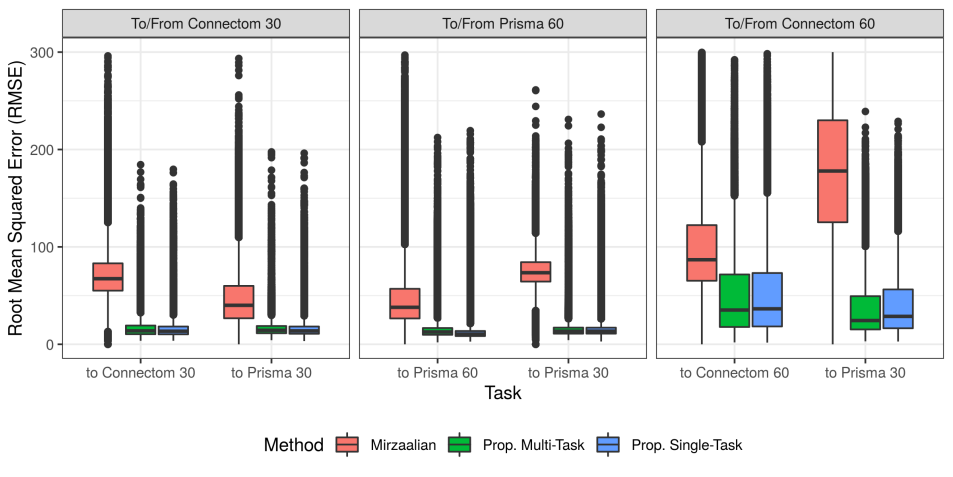


Bound from Moyer et al. 2018:

$$I(z,s) \leq \underbrace{-\mathbb{E}_{x,s,z\sim q}[\log p(x|z,s)]}_{\text{Cond. Reconstruction}} + \underbrace{\mathbb{E}_x[\, KL[\, q(z|x) \parallel q(z)\,]\,]}_{\text{Compression}} - \underbrace{H(x|s)}_{\text{Const}}.$$

Comparison

MICCAI CDMRI Challenge 2018 dataset, Mirzaalian et al. 2018 Baseline



End

Links:

- Paper: arxiv:1904.05375
- NeurIPS Paper: arxiv:1805.09458 arxiv:1904.07199
- Inv. Code: https://github.com/dcmoyer/
- Questions: dmoyer@csail.mit.edu

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