



ECE 599/692 – Deep Learning



Lecture 18 – How to Design a Network?

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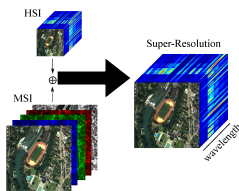
How to find a research topic?

- According to Andrew Ng
 - Read a lot of papers
 - Re-implement them
 - Work hard

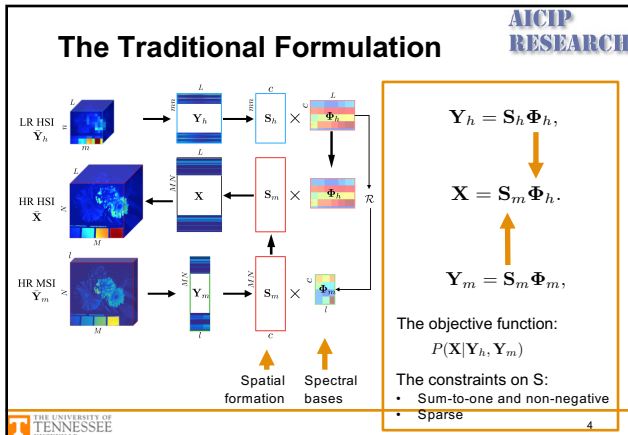
Hyperspectral Image (HSI) Super-Resolution (SR)

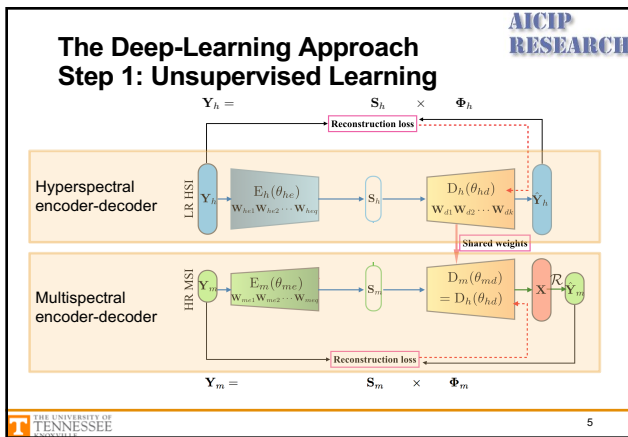
Hyperspectral images (HSI):
Low spatial but high spectral resolution

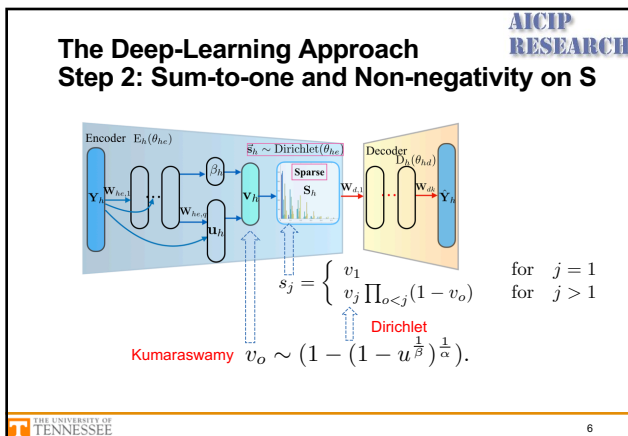


HSI-SR:
High spatial and High spectral resolution

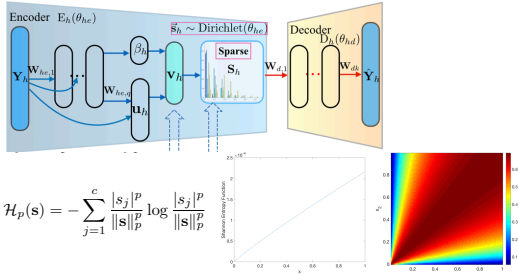
Multispectral images (MSI):
High spatial but low spectral resolution



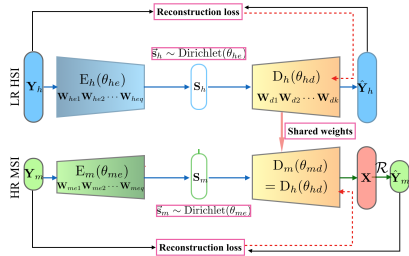




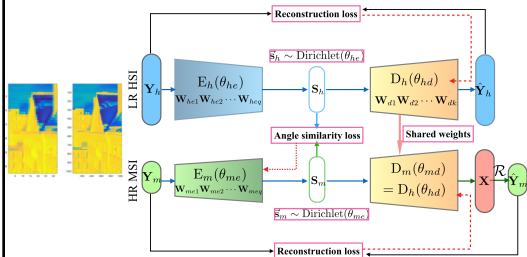
The Deep-Learning Approach Step 3: Sparsity on S



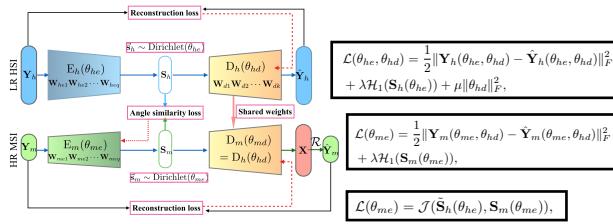
The Deep-Learning Approach Step 4: The Angular Similarity Constraint



The Deep-Learning Approach Step 4: The Angular Similarity Constraint



The Deep-Learning Approach Review: Our Objectives and Formulation



$$\mathcal{L}(\theta_{he}, \theta_{hd}) = \frac{1}{2} \|\mathbf{Y}_h(\theta_{he}, \theta_{hd}) - \hat{\mathbf{Y}}_h(\theta_{he}, \theta_{hd})\|_F^2 + \lambda \mathcal{H}_1(\mathbf{S}_h(\theta_{he})) + \mu \|\theta_{hd}\|_F^2,$$

$$\mathcal{L}(\theta_{me}) = \frac{1}{2} \|\mathbf{Y}_m(\theta_{me}, \theta_{hd}) - \hat{\mathbf{Y}}_m(\theta_{me}, \theta_{hd})\|_F^2 + \lambda \mathcal{H}_1(\mathbf{S}_m(\theta_{me})),$$

$$\mathcal{L}(\theta_{me}) = \mathcal{J}(\hat{\mathbf{S}}_h(\theta_{he}), \mathbf{S}_m(\theta_{me})).$$

Ying Qu, Hairong Qi, Chiman Kwan, "Unsupervised sparse Dirichlet-net for hyperspectral image super-resolution," CVPR'18.
