STRUCTURED SET MATCHING NETWORKS FOR ONE-SHOT PART LABELING

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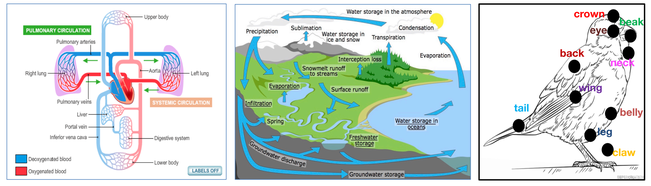
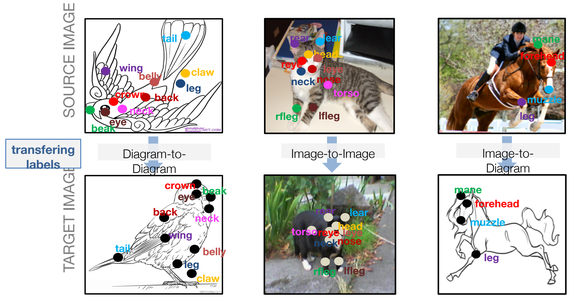
Diagrams: Great test beds for visual reasoning

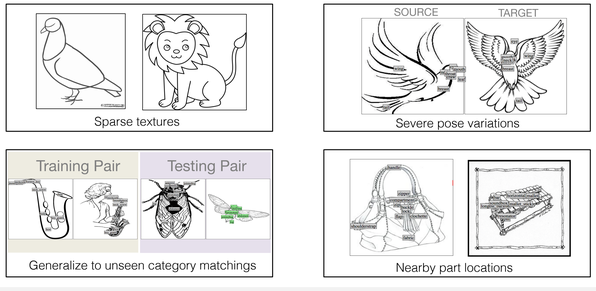


Large scale datasets are not always available

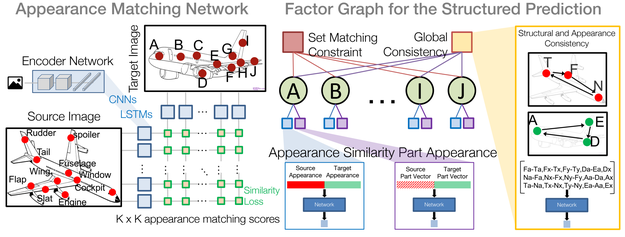
Especially the detailed visual recognition such as **Part Labeling** task



Challenges



Structured Set Matching Networks (SSMN)



Matching Scoring Function & Loss Function

Scoring Function

$$f(m) = \sum_i \left(f_a(m(i), i) + f_p(m(i), i)\right) + f_m(m) + f_{gc}(m)$$

Appearance similarity · Part appearance similarity · Matching constraint · Global consistency

Loss function

Learning as Search Optimization (LaSO) by beam search

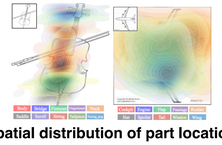
$$\mathcal{L}(f) = \sum_{t=1}^{T} \max(0, \Delta(m_t^*, \hat{m}_t^i) + f(\hat{m}_t^B) - f(m_t^*)).$$

Datasets

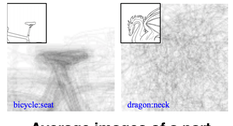
Diagram Part Label (DiPART)

4,921 Images
71,521 Total Pairs

Challenges



Spatial distribution of part locations
(Left) Coherently (Right) Incoherently distributed parts



Average images of a part
(Left) Scale and shape coherence (Right) Incoherence

Pascal Part Matching (PPM)

A subset of pascal part dataset

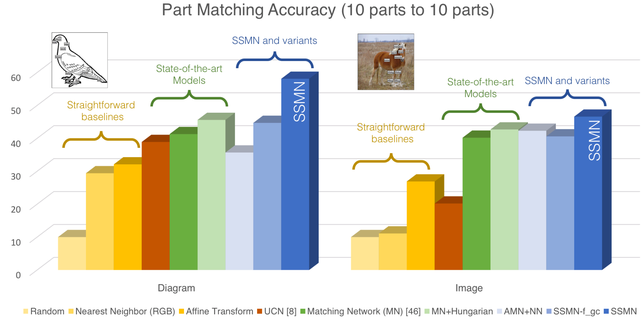
2,326 Images
55,450 Total Pairs

Cross-DiPART-PPM

A combination of DiPART and PPM

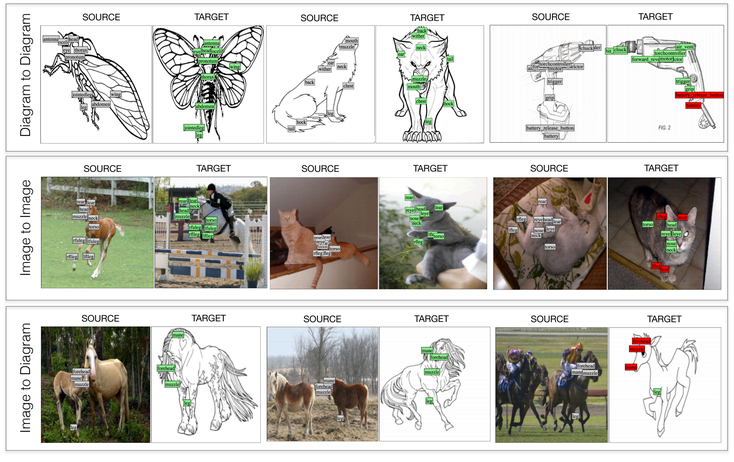
1,043 Images
27,449 Total Pairs

Results: Quantitative Analysis



[8] **Universal correspondence network.** C. B. Choy, J. Gwak, S. Savarese, and M. K. Chandraker, **NIPS 2016**
[46] **Matching Networks for One Shot Learning.** O. Vinyals, C. Blundell, T. Lillicrap, K. Kavukcuoglu, and D. Wierstra., **NIPS 2016**

Results: Qualitative Analysis



Project Page: Datasets, Paper, Supplementary material
https://prior.allenai.org/projects/matching-part-label

* Indicates equal contribution