

Paper summary: Representation learning: A review and new perspectives

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1 What makes aa representation good

1. *smoothness*: f s.t. $x \approx y$ implies $f(x) \approx f(y)$
2. *multiple explanatory factors* a.k.a. disentangling features
3. *semi-supervised learning*: for input Z and target Y , learning $P(X)$ helps learning $P(Y|X)$ because features of X help explain Y
4. *shared factors across tasks*: like previous point, but also works for different Y s
5. *manifolds*: probability mass concentrates in regions with much smaller dimensionality than data itself
6. *natural clustering*: different values of categorical variables are associated with separate manifolds.
7. *temporal and spatial coherence*: consecutive or spatially nearby observations tend to be associated with the same value of relevant categorical concepts or result in small surface move on the surface of the manifold
8. *sparsity*: