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# Resolutions/Wishes for 2022! :)

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# Unsupervised Representation Learning

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UTMIST Study Group

# Agenda

## Module 4

- Unsupervised Learning
  - Autoencoders
  - Natural Language Processing
  - Word Embeddings
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# 1 Unsupervised Learning

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# What comes to mind when you think of Unsupervised Learning?

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# Unsupervised Learning

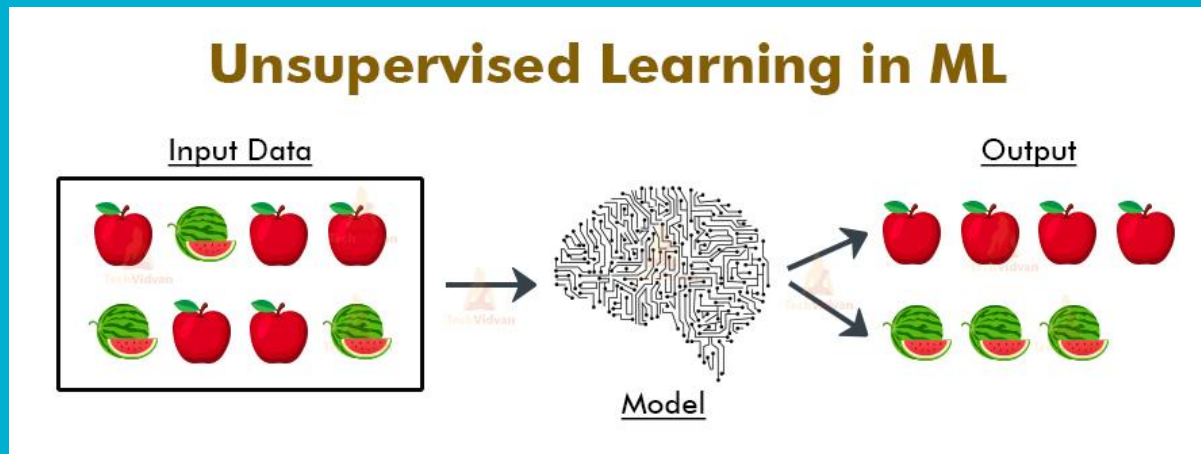
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What?

- No labels

Why?

- Extract data structure
- Less costly data



<https://techvidvan.com/tutorials/wp-content/uploads/sites/2/2020/07/Unsupervised-Learning-in-ML-1.jpg>

# 2

# Autoencoders

# Autoencoders

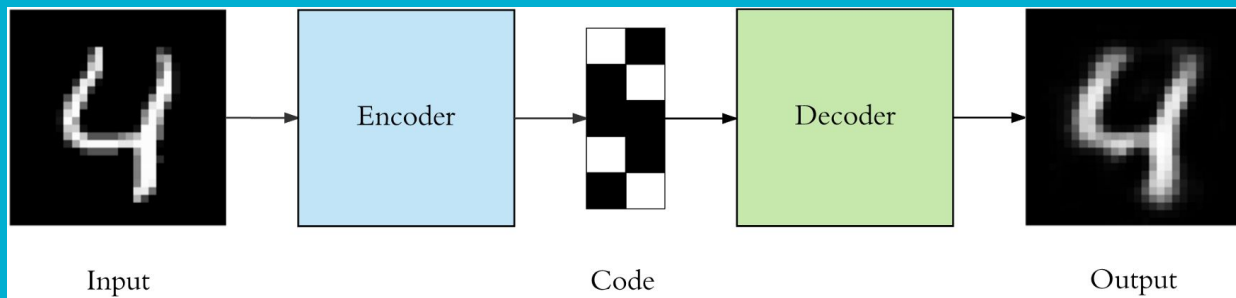
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## Definition

- Compress input
- Reconstruct output

## Applications

- Compress data
- Reduce dimensionality
- Learn Features
- Unsupervised pre-training



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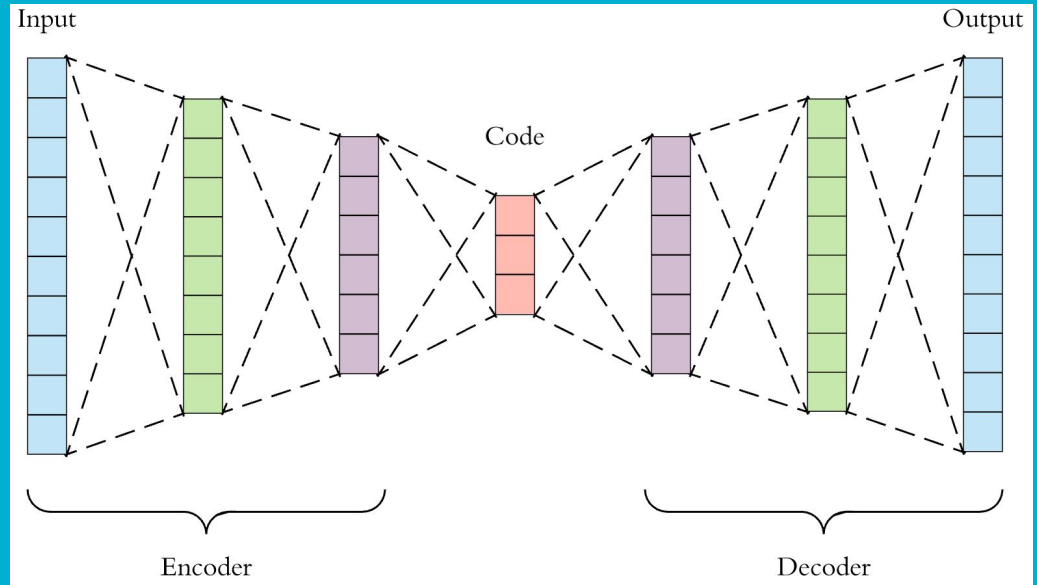
# Architecture

## Structure

- Artificial neural network
- Symmetrical

## Hyperparameters

- Code size
- # layers
- # neurons/layer

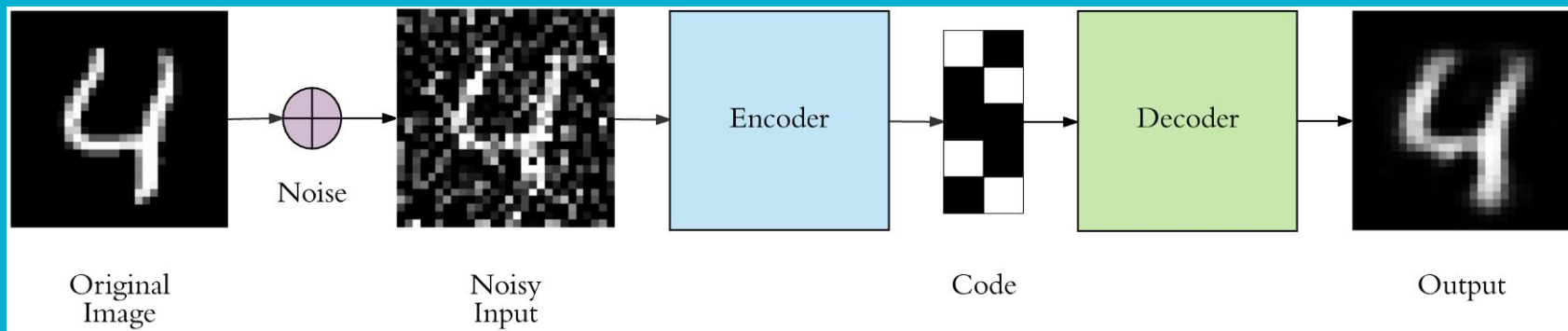


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# Denoising Autoencoders

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- Add noise to input
- Force autoencoder to learn useful features
- Recover original input

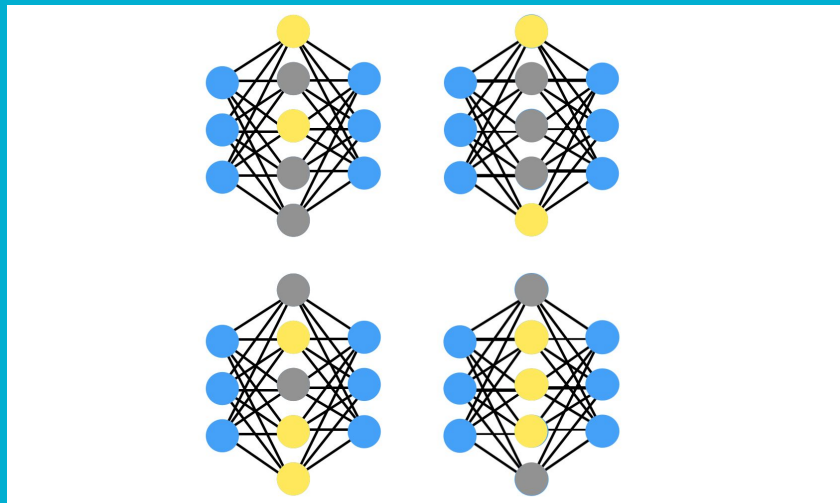


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# Sparse Autoencoders

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- Regularization to force autoencoder to learn useful features
- Sparsity constraint: only a fraction of nodes would be active



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# 3. Natural Language Processing

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# What are some possible applications of NLP in real life?

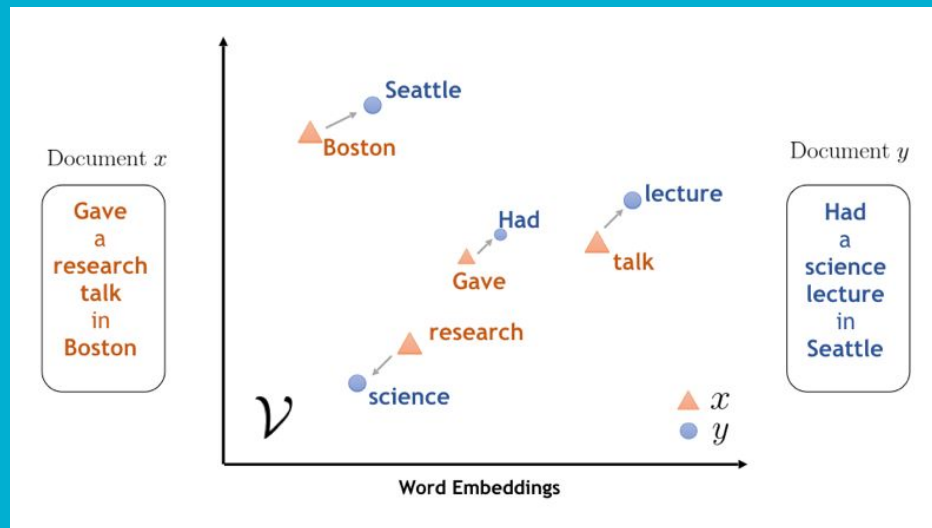
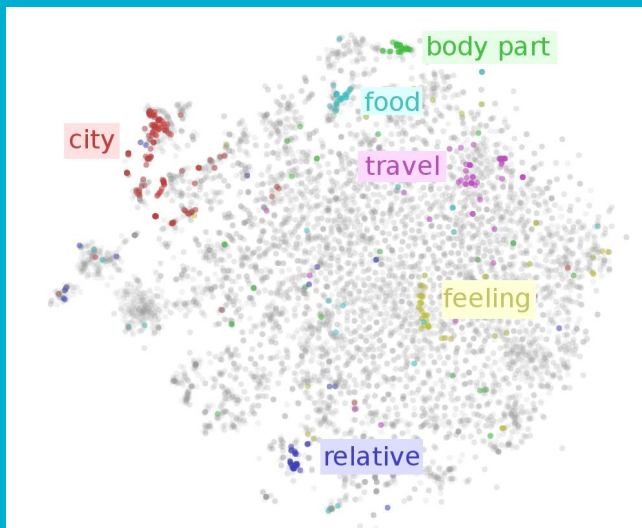
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Machines can understand meaning behind words.

# Word Embeddings

- Vector representation of a word
- Words with similar meaning are closer spatially



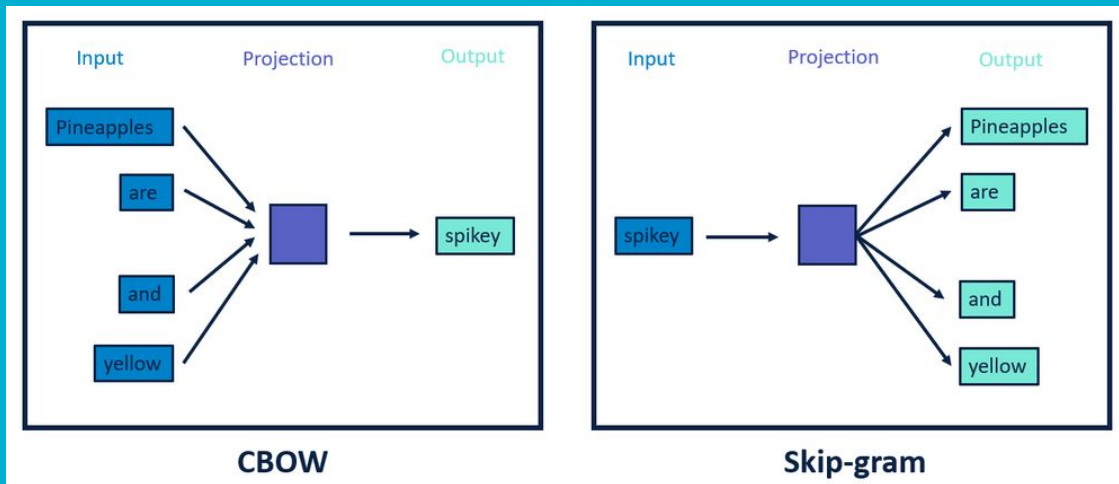
# Word2Vec

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Model for learning the embedding

CBOW: predict context words

Skip-Gram: predict target word





# 4 Discussion

**Thank You! :)**