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# DEEP LEARNING

## Model Selection Cheat Sheet

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## IMAGE CLASSIFICATION

**Convolutional Neural Network (CNN):** Ideal for classifying images, detecting patterns, and spatial hierarchies.

## OBJECT DETECTION

**Region-based CNNs (R-CNN, Fast R-CNN, Faster R-CNN):** Excellent for detecting and classifying objects within images.

## IMAGE GENERATION

**Generative Adversarial Network (GAN):** Great for generating realistic images and data synthesis.



## NATURAL LANGUAGE PROCESSING

- **Recurrent Neural Network (RNN):** Suitable for sequential data, such as text, due to its ability to consider previous inputs.
- **Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU):** Variants of RNNs that address the vanishing gradient problem, making them more effective for longer sequences.
- **Transformer:** Particularly effective for NLP tasks, such as language translation and understanding context in large amounts of text.

## SPEECH RECOGNITION

- **Recurrent Neural Network (RNN) with Long Short-Term Memory (LSTM) or Gated Recurrent Unit (GRU):** Effective for sequential data like audio signals.



## REGRESSION PROBLEMS

- **Feedforward Neural Network (FNN):** Suitable for predicting continuous values.

## TIME SERIES PREDICTION

- **Recurrent Neural Network (RNN) or Long Short-Term Memory (LSTM):** Effective for predicting sequences over time.

## ANOMALY DETECTION

- **Autoencoder:** Useful for learning the normal patterns in data and identifying anomalies.

## TRANSFER LEARNING

- **Pre-trained models (e.g., VGG16, ResNet, BERT):** Leveraging models trained on large datasets for a specific domain and fine-tuning for a specific task with a smaller dataset.



## REINFORCEMENT LEARNING

- **Deep Q Network (DQN):** Used for solving problems with discrete action spaces.
- **Policy Gradient Methods:** Suitable for problems with continuous action spaces.

## RECOMMENDATION SYSTEMS

- **Matrix Factorization Models:** Effective for collaborative filtering in recommendation systems.
- **Neural Collaborative Filtering:** Utilizing neural networks to model user-item interactions.



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