A08 Binary Brains Cheat sheet

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Installation Instructions:	**Basic Usage Examples:**
!pip install tensorflow	TensorFlow: Import tensorflow as tf
!pip install keras	Keras: import keras
!pip install opencv-python	OpenCV: import cv2

Object Detection Task Steps:

Data Collection: Obtain labeled images with annotations.	Preprocessing: Resize, normalize images.
Model Selection: Choose a suitable detection model.	Training: Fine-tune model on labeled dataset.
Evaluation: Measure performance using metrics like IoU	Inference: Apply trained model for object detection.

Common Challenges and Troubleshooting:

Overfitting: Regularization, data augmentation.	Data Imbalance: Class weighting, augmentation techniques.
Performance: Hyperparameter optimization, model architect	Runtime Efficiency: Model quantization, hardware acceleration
Poor Localization: Experiment with different network architectures or adjust hyperparameters.	

Common Applications of Object Detection:

Self-driving cars: Identify pedestrians, vehicles and traffic signs.	Facial Recognition: Detect faces for identification.
Medical Scan (X-ray, CT scan): Detect anomalies like tumors.	Inventory Management: Automatic stock checks & reordering.
Robotics: Accurate perception for precision intensive tasks	

Concepts:

Bounding boxes: Rectangular boxes indicating object location.	Annotations: Labels assigned to bounding boxes.
Confidence scores: Model's certainty about detection.	Intersection over Union (IoU): Measure of overlap between boxes.

Common Algorithms:

R-CNN: Regions with CNN features	Fast R-CNN: Improved speed over typical R-CNN
Faster R-CNN: Improved speed & accuracy. (High precision)	SSD (Single Shot MultiBox Detector): 1 shot detection.
YOLO (You Only Look Once): Good for real-time applications.	

Tools & Libraries:

TensorFlow: Open-source framework for machine learning.	Keras: High-level API simplifying development
OpenCV: Library for computer vision functions	

Resources:

TensorFlow: [API Documentation | TensorFlow v2.16.1]	Keras: [Developer guides (keras.io)]
OpenCV: [OpenCV: OpenCV modules]	R-CNN: trainRCNNObjectDetector, rcnnObjectDetector,
SSD: trainSSDObjectDetector	YOLO: trainYOLOv3ObjectDetector