

# Artificial Intelligence Pre-trained Models

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1. Vision Models

Model Name	Framework	Use Case
ResNet (18/34/50/101)	PyTorch, TF	Image classification
VGG (16/19)	PyTorch, TF	Image classification
EfficientNet (B0-B7)	PyTorch, TF	Scalable image classification
MobileNet (V1-V3)	PyTorch, TF	Mobile-friendly image classification

DenseNet	PyTorch, TF	Image classification
InceptionV3	TensorFlow	Image classification
ViT (Vision Transformer)	Hugging Face	Transformer-based vision tasks
DeiT	Facebook AI	Data-efficient vision transformer
ConvNeXt	PyTorch	Modern CNN architecture
YOLOv3-v8	PyTorch	Real-time object detection
SSD	TensorFlow	Single Shot Detection
Faster R-CNN	PyTorch, Detectron2	Object detection
Mask R-CNN	Detectron2	Instance segmentation
SAM (Segment Anything)	Meta AI	Universal image segmentation
CLIP	OpenAI	Vision-language understanding
DINO / DINOv2	Meta AI	Self-supervised learning on images
OpenSeg	Facebook AI	Zero-shot segmentation
Swin Transformer	Microsoft	Hierarchical vision transformer
BEiT	Microsoft	Masked image modeling

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**2. Image Generation Models**

Model	Framework	Description
Stable Diffusion	Hugging Face	Text-to-image generation
DALL·E 2 / DALL·E 3	OpenAI	Text-to-image generation
Midjourney	Proprietary	Artistic image generation
StyleGAN2 / 3	NVIDIA	Face & object generation
BigGAN	TensorFlow	Class-conditional image synthesis
Imagen	Google Brain	Photorealistic image generation

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**3. Text Generation Models**

Model	Framework	Description
GPT-2 / 3 / 4	OpenAI	General-purpose text generation

LLaMA (1-3)	Meta	Lightweight open LLMs
Mistral / Mixtral	Hugging Face	Efficient LLMs
BLOOM	BigScience	Multilingual open LLM
Claude	Anthropic	Constitutional AI
Gemini	Google	Multimodal text generation
Falcon	TII	Open-source LLM
Orca / Orca Mini	Microsoft	Instruction-fine-tuned models

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#### 4. Video / Motion Generation Models

Model	Framework	Description
Sora	OpenAI	Text-to-video generation
Runway Gen-2	Proprietary	Multi-modal video generation
Make-A-Video	Meta AI	Text → short video
VideoCrafter	Hugging Face	Open video diffusion models

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#### 5. Time Series Models

Model Name	Framework	Use Case
ARIMA / SARIMA	StatsModels	Classic time series forecasting
Prophet	Facebook	Easy-to-use forecasting
DeepAR	Amazon GluonTS	Probabilistic TS forecasting
TFT (Temporal Fusion Transformer)	PyTorch	Interpretable multi-series forecasting
N-BEATS / N-HITS	PyTorch, GluonTS	Deep learning TS models
Informer / Autoformer	PyTorch	Transformer-based forecasting
Darts Models	Darts	Unified forecasting API

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#### 6. Regression Models

Model Name	Framework	Use Case
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LinearRegression	Scikit-learn	Simple regression
Ridge / Lasso	Scikit-learn	Regularized regression
RandomForestRegressor	Scikit-learn	Ensemble regression
XGBoost Regressor	XGBoost	Gradient-boosted regression
LightGBM Regressor	LightGBM	Efficient tree-based regression
CatBoost Regressor	CatBoost	Categorical feature-aware regressor
MLPRegressor	Scikit-learn	Neural net regression

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## 7. Classification Models

Model Name	Framework	Use Case
LogisticRegression	Scikit-learn	Binary classification
DecisionTreeClassifier	Scikit-learn	Tree-based classification
RandomForestClassifier	Scikit-learn	Ensemble classifier
XGBoostClassifier	XGBoost	GBDT classifier
LightGBMClassifier	LightGBM	Fast tree classifier
CatBoostClassifier	CatBoost	Categorical-data classifier
SVM	Scikit-learn	Kernel-based classification
MLPClassifier	Scikit-learn	Neural network classifier

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## 8. NLP Models

Model Name	Framework	Use Case
BERT / RoBERTa	Hugging Face	General NLP encoding
DistilBERT	Hugging Face	Lightweight transformer
ALBERT / XLNet	Hugging Face	Advanced pretraining methods
T5 / BART	Hugging Face	Text-to-text transformers
GPT-2 / GPT-3 / GPT-4	OpenAI	Language generation

LLaMA / Mistral	Meta, Hugging Face	Efficient LLMs
Longformer	Hugging Face	Long-context inputs
mBERT / XLM-R	Hugging Face	Multilingual NLP
Sentence-BERT	Hugging Face	Sentence embeddings
Whisper	OpenAI	Speech-to-text
Wav2Vec 2.0	Facebook AI	Audio representation learning

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## 9. Speech, Audio & Music Models

Model Name	Framework	Use Case
Whisper	OpenAI	ASR
DeepSpeech	Mozilla	Speech recognition
Wav2Vec 2.0	Facebook AI	Self-supervised ASR
HuBERT	Facebook AI	Speech unit learning
Tacotron 2	TensorFlow	Text-to-speech
FastSpeech 2	Microsoft	Efficient TTS
MelGAN	NVIDIA	Neural vocoder
MusicGen	Meta	Music generation
Jukebox	OpenAI	Music + lyrics generation

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## 10. OCR & Document Models

Model Name	Framework	Use Case
Tesseract	Google	OCR Engine
EasyOCR	PyTorch	Multilingual OCR
PaddleOCR	PaddlePaddle	High-accuracy OCR
TrOCR	Hugging Face	Transformer OCR
Donut	Naver AI	Document understanding
DocTR	Mindee	Layout-aware OCR

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## 11. Recommender Systems

Model Name	Framework	Use Case
Wide & Deep	TensorFlow	Combined recommender
DeepFM	TensorFlow, PyTorch	Feature interaction
LightFM	Python	Hybrid collaborative filtering
NCF	TensorFlow	Neural CF
RecBole	PyTorch	Standardized RS hub
DIN / DIEN	Alibaba	Behavior modeling

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## 12. Geospatial / Remote Sensing Models

Model Name	Framework	Use Case
U-Net	Keras, PyTorch	Image segmentation
DeepGlobe	PyTorch	Satellite analysis
Mask2Former	Meta	Segmentation
TernausNet	PyTorch	Binary segmentation
Sentinel Models	EO Platforms	Multispectral analysis

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## 13. Scientific / Biomedical Models

Model Name	Framework	Use Case
AlphaFold 2	DeepMind	Protein folding
ESMFold	Meta	Protein structure
BioBERT	Hugging Face	Biomedical NLP
PubMedBERT	Hugging Face	Research NLP
ClinicalBERT	Hugging Face	Medical text
SciBERT	AllenAI	Scientific papers
ChemBERTa	Hugging Face	Chemistry NLP

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## 14. 3D & Point Cloud Models

Model Name	Framework	Use Case
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PointNet / PointNet++	PyTorch	3D classification
PointNeXt	PyTorch	Efficient 3D models
Point-BERT	Hugging Face	Transformer for 3D
MeshCNN	PyTorch	Mesh convolution
KPConv	PyTorch	Point cloud segmentation

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## 15. Robotics & Agents Models

Model Name	Framework	Use Case
RoboNet	Berkeley AI	Robotic actions
RT-1 / RT-2	Google	Robotics transformer
VIMA	Meta	Multimodal robot tasks
Gato	DeepMind	General embodied agent
Habitat-Sim	Facebook AI	3D navigation

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## 17. Face Detection, Recognition & Swap

Model Name	Framework	Use Case
MTCNN	PyTorch, Keras	Face detection (multi-stage)
RetinaFace	PyTorch, TF	High-accuracy face detection
BlazeFace	TensorFlow Lite	Real-time mobile face detection
FaceNet	TensorFlow	Face recognition + embeddings
ArcFace	PyTorch	High-performance face recognition
Dlib Face Recognition	Dlib	Lightweight face embeddings
InsightFace	MXNet, PyTorch	Face recognition suite
FaceSwap	DeepFaceLab	Face swapping
SimSwap	PyTorch	Face swap with same identity
DeepFaceLab	Python	Face replacement & reenactment

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18. Image Restoration & Upscaling

Model Name	Framework	Use Case
ESRGAN	PyTorch	Super-resolution GAN
Real-ESRGAN	PyTorch	Photo-realistic upscaling
SwinIR	PyTorch	Transformer-based restoration
GFPGAN	PyTorch	Face restoration
TecoGAN	TensorFlow	Video super-resolution
Waifu2x	Caffe, PyTorch	Anime image upscaling
CodeFormer	PyTorch	Face restoration
RestoreFormer	PyTorch	Old photo restoration

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19. Background Removal / Segmentation

Model Name	Framework	Use Case
MODNet	PyTorch	Real-time background removal
RVM (Robust Video Matting)	PyTorch	Background matting
U <sup>2</sup> -Net	PyTorch	Salient object segmentation
BASNet	PyTorch	Foreground segmentation
Segment Anything (SAM)	Meta AI	Zero-shot segmentation

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20. Human Pose Estimation

Model Name	Framework	Use Case
OpenPose	Caffe, PyTorch	Multi-person pose estimation
PoseNet	TensorFlow	Lightweight pose estimation
AlphaPose	PyTorch	High-accuracy pose estimation
BlazePose	TF Lite	Fast pose estimation
HRNet	PyTorch	High-resolution keypoints

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## 21. Image Inpainting / Completion

Model Name	Framework	Use Case
LaMa	PyTorch	Large-mask inpainting
EdgeConnect	PyTorch	Edge-guided inpainting
DeepFill v2	TensorFlow	Content-aware fill
Paint-by-Example	Hugging Face	Patch-based inpainting
SD-Inpainting	Diffusion	Stable Diffusion inpainting

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## 22. Emotion / Age / Gender Detection

Model Name	Framework	Use Case
FER+	Keras	Facial emotion recognition
DeepFace	Python	Age, gender, emotion, match
Emotion-FAN	PyTorch	Fine-grained emotion analysis
AgeNet / GenderNet	Caffe	Lightweight classifiers

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## 23. Depth Estimation / 3D from 2D

Model Name	Framework	Use Case
MiDaS	PyTorch	Monocular depth estimation
DPT	PyTorch	High-resolution depth
AdaBins	PyTorch	Bin-based depth prediction
Boosting Monocular Depth	PyTorch	Fusion-based depth refinement

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## 24. Style Transfer & Artistic Effects

Model Name	Framework	Use Case
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Fast Neural Style Transfer	PyTorch	Real-time artistic filters
CycleGAN	PyTorch	Image-to-image translation
Pix2Pix	TensorFlow	Sketch → photo, maps, etc.
Artistic Style Transfer	TensorFlow	Classic styling
StyleClip	OpenAI / CLIP	Text-guided style transfer

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## 25. Video & Object Tracking

Model Name	Framework	Use Case
SORT / DeepSORT	Python	Real-time tracking
ByteTrack	PyTorch	High-accuracy MOT
FairMOT	PyTorch	Detection + tracking
TrackFormer	Transformer	Video instance tracking

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## 26. Image Similarity / Retrieval

Model Name	Framework	Use Case
CLIP	OpenAI	Vision-text similarity
Deep Ranking	TensorFlow	Visual similarity
ImageBind	Meta	Multimodal retrieval
VGG-Face	Keras, Torch	Face embedding similarity

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## 27. Body, Hand & Face Landmark Detection

Model Name	Framework	Use Case
MediaPipe Face Mesh	MediaPipe	468 face landmarks
MediaPipe Hands	MediaPipe	21 hand keypoints
MediaPipe Holistic	MediaPipe	Full-body tracking

OpenPose Hand / Body	PyTorch	Multi-person keypoints
VNect	PyTorch	3D human pose estimation

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## 28. Medical Imaging Models

Model Name	Framework	Use Case
U-Net++ / U-Net3D	Keras, PyTorch	Medical segmentation
nnU-Net	MONAI	Auto-configuring segmentation
TransUNet	Transformers	Hybrid CNN + Transformer
Med3D	PyTorch	3D medical features
MONAI Models	MONAI	MRI/CT analysis

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## 29. Optical Flow / Motion Estimation

Model Name	Framework	Use Case
RAFT	PyTorch	Dense optical flow
FlowNet / FlowNet2	PyTorch	Motion estimation
PWC-Net	TensorFlow	Lightweight optical flow

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## 30. Image-to-Image / Sketch-to-Real

Model Name	Framework	Use Case
Pix2PixHD	TensorFlow	High-res image translation
SPADE	NVIDIA	Semantic image synthesis
PaintsChainer	Web, PyTorch	Auto-colorization
Deep Image Analogy	PyTorch	Style-preserving translation

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## 31. Multimodal & Cross-Modal Models

Model Name	Framework	Use Case
CLIP	OpenAI	Vision-text embedding
BLIP / BLIP-2	Salesforce	Image caption + QA
LLaVA	Multimodal LLM	Visual chat
ImageBind	Meta	6-modality alignment
Flamingo	DeepMind	Few-shot multimodal
Kosmos-2	Microsoft	VQA + OCR + grounding

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### 32. AR/VR & Avatar Models

Model Name	Framework	Use Case
Avatarify	Python	Real-time avatars
HeadGAN	GANs	Talking head generation
DeepMotion Avatar	Proprietary	Motion → 3D avatar
Animatable NeRFs	NeRF	Pose-controlled humans
iMapper	PyTorch	AR pose estimation

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### 33. Video Captioning & Visual QA

Model Name	Framework	Use Case
VideoBERT	Hugging Face	Video-text modeling
FrozenBiLM	DeepMind	Video captioning
ClipCap	Hugging Face	Captioning via CLIP+Transformer
MERLOT / MERLOT Reserve	AllenAI	Temporal reasoning

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### 34. NeRF (Neural Radiance Fields)

Model Name	Framework	Use Case
NeRF (original)	PyTorch	Novel view synthesis

Instant-NGP	NVIDIA	Real-time NeRF
Mip-NeRF	Google Research	Efficient NeRF
DreamFusion	Google + SD	Text → 3D
Luma AI	Proprietary	iPhone-based NeRF capture

### 35. Scene Graph & Layout Models

Model Name	Framework	Use Case
SG2Im	GANs	Scene graph → image
LayoutGAN	PyTorch	Document layout generation
DocVQA	Hugging Face	Document question answering
DocPrompt	Layout-Aware LLM	Document reasoning

### 36. Other Specialized Tasks

Task Type	Example Models	Framework
License Plate Recognition	EasyOCR, PaddleOCR	PyTorch, PaddlePaddle
Handwriting Generation	MyTextInYourHandwriting	PyTorch
Eye Gaze Estimation	ETH-XGaze, MPIIGaze	PyTorch
Lip Reading	LipNet, LRW	PyTorch, TF
3D Human Mesh Recovery	SPIN, HMR	PyTorch
3D Object Reconstruction	Occupancy Networks	PyTorch
Clothing Try-on	VITON, CP-VTON	PyTorch

### 37. NVIDIA Jetson Edge AI Models

*(Optimized for TensorRT, ONNX, DeepStream, JetPack, TAO Toolkit)*

Model Name	Format	Use Case
YOLOv4-Tiny / YOLOv5s	ONNX / TRT	Real-time object detection

SSD-Mobilenet v2	ONNX / TRT	Lightweight object detection
RetinaFace	ONNX / TRT	Real-time face detection
DeepStream PeopleNet	TensorRT Engine	People detection & counting
DeepStream FaceNet	TensorRT	Face embeddings
TAO EmotionNet	.etlt / TRT	Facial emotion recognition
TAO License Plate Net	.etlt / TRT	License plate detection
PoseNet	ONNX	Human pose estimation
Depth Estimation (MiDaS)	ONNX	Depth from single image
UNet / BiSeNet	ONNX / TRT	Semantic segmentation
Faster R-CNN (TAO)	.etlt / TRT	Object detection
ActionRecognitionNet (TAO)	.etlt	Gesture/action recognition
EfficientNet-Lite	ONNX	Efficient classification

### 38. Google Coral Edge TPU Models (.tflite + .edgetpu)

*(Optimized via Edge TPU Compiler)*

Model Name	Use Case	Source
MobileNet SSD v2	Object detection (90 COCO classes)	Coral Model Zoo
EfficientNet-Lite0	Image classification	Coral Model Zoo
MobileNet v1	Classification (flowers, etc.)	Coral Model Zoo
PoseNet	Pose estimation	Coral Model Zoo
Person Detection	Single-class person detector	Coral Model Zoo
DeepLab v3+	Semantic segmentation	Coral Model Zoo
YAMNet (Edge TPU)	Audio classification	Coral Model Zoo
Speech Commands	Wake word detection	Coral Model Zoo
MobileFaceNet	Face recognition embeddings	Coral Community
AutoML Edge TPU Models	Custom classification	Vertex AI

## 39. Arduino Edge Impulse / TinyML Models

(Optimized for Nano BLE Sense, Portenta, Pico, ESP32, etc.)

### 39.1 Vision Models (96×96 or 160×160)

Model Name	Use Case	Platform
Image Classification FOMO	Low-power object classification	Arduino Nano, Portenta
MobileNet (Edge Impulse)	Transfer learning classification	All image-capable boards
FOMO	Tiny object detection	Edge Impulse Studio
Object Detection (YOLO-like)	2-class + custom datasets	Portenta, Nano, ESP32-S3
Gesture Recognition (Accelerometer)	Tap, shake, double-tap	All accelerometer boards

### 39.2 Audio Models

Model Name	Use Case	Platform
Keyword Spotting	Wake words (yes/no/up/down)	Arduino Nano BLE Sense
Environmental Sounds	Bark, glass break, alarms	ESP32-S3, Raspberry Pi
Snoring Detection	Audio anomaly detection	Edge Impulse Studio
Bird Detection (Tiny Audio)	Outdoor sound monitoring	LoRa boards, Arduino Pro

### 39.3 Sensor Models (IMU / Environmental / Motion)

Model Name	Use Case	Platform
Anomaly Detection (IMU)	Machine vibration anomaly	Any IMU board
Activity Classification	Walk, run, jump	Arduino Nano BLE Sense
Fall Detection	Elderly care safety	Arduino Portenta H7
Motion-Triggered Events	Smart lighting, access control	ESP32, Nano, Pico



#### 40. Tools & Model Sources

Platform / Tool	URL	Supports
Hugging Face	<a href="https://huggingface.co/models">https://huggingface.co/models</a>	NLP, vision, audio, multimodal
TensorFlow Hub	<a href="https://tfhub.dev">https://tfhub.dev</a>	TensorFlow models
Torch Hub	<a href="https://pytorch.org/hub">https://pytorch.org/hub</a>	Vision, audio, NLP
Model Zoo (ONNX)	<a href="https://github.com/onnx/models">https://github.com/onnx/models</a>	ONNX pretrained models
Replicate	<a href="https://replicate.com">https://replicate.com</a>	Web-deployable models
Papers With Code	<a href="https://paperswithcode.com">https://paperswithcode.com</a>	SOTA benchmarks
Coral Model Zoo	<a href="https://coral.ai/models/">https://coral.ai/models/</a>	Edge TPU models
Arduino + Edge Impulse	<a href="https://studio.edgeimpulse.com/">https://studio.edgeimpulse.com/</a>	TinyML training
Edge TPU Compiler	<a href="https://coral.ai/docs/edgetpu/compiler/">https://coral.ai/docs/edgetpu/compiler/</a>	TPU optimization
Edge Impulse CLI	npm install -g edge-impulse-cli	Device connectivity
TinyML Examples	<a href="https://github.com/tinyMLx">https://github.com/tinyMLx</a>	TinyML resources

#### 41. Example Combined Edge AI Use Cases

Project	Hardware	Pretrained Model Used
AI-based Bird Detector	ESP32-CAM + Coral USB	MobileNet / Edge TPU Classification
Snore / Wake Word Monitor	Arduino Nano 33 BLE Sense	KWS Model / MFCC
People Counter with FOMO	Portenta + OV7670 Camera	FOMO
Gesture-controlled LED	Nano BLE Sense	Accelerometer Classification
Wildfire Detection Drone	Jetson Nano + Coral	DeepLab v3+ + SSD Mobilenet