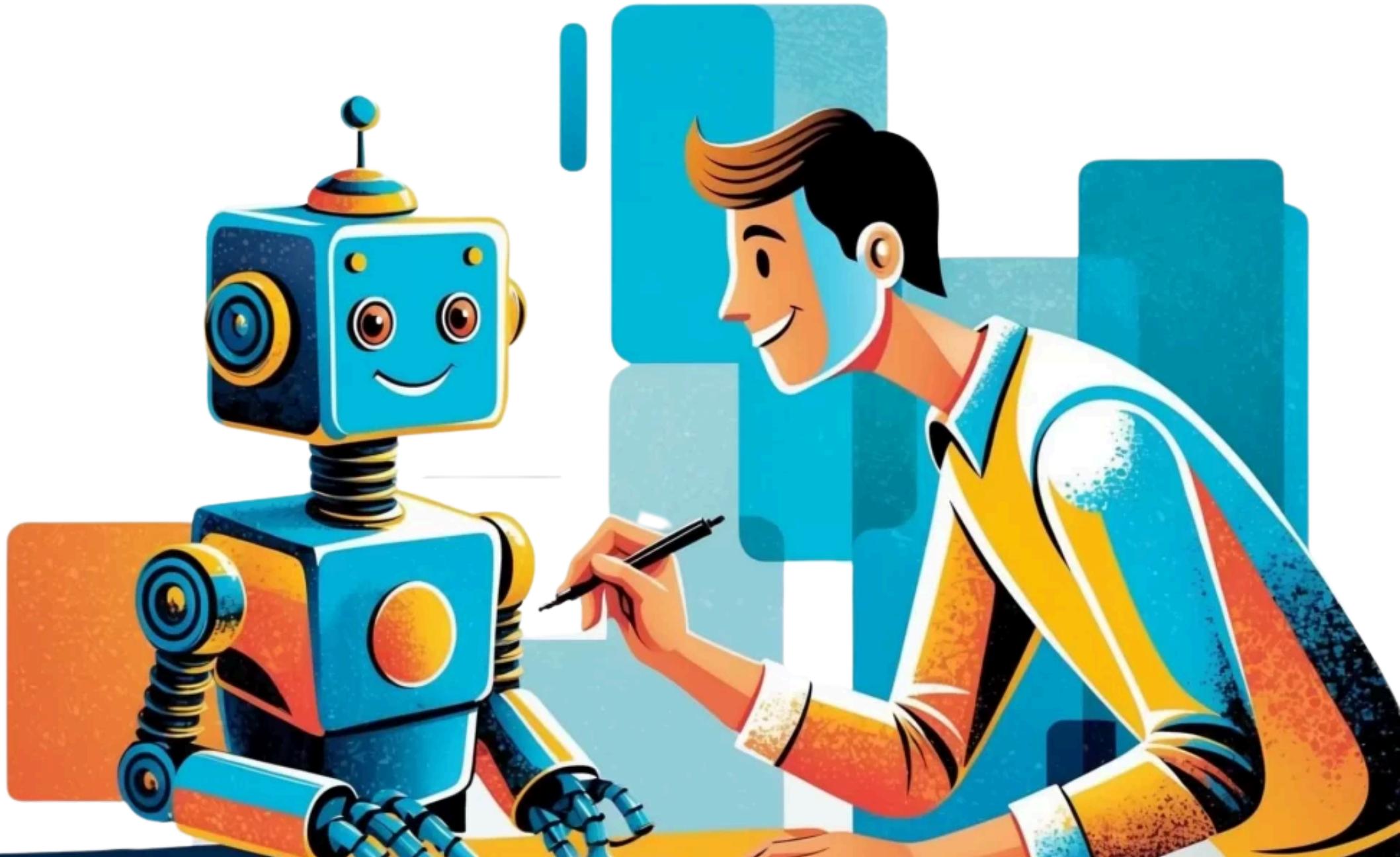




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Product Leader at
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20 CORE AI CONCEPTS POWERING THE MODERN WORLD





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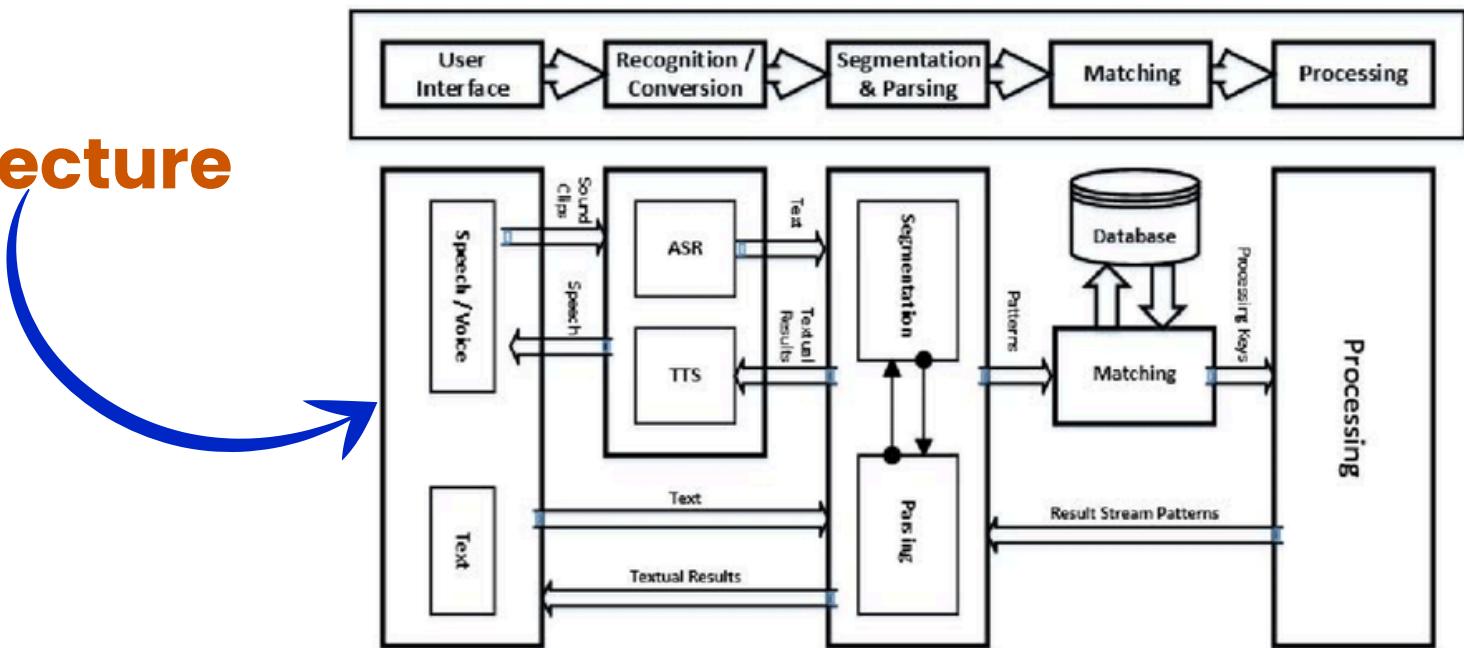
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1. NATURAL LANGUAGE PROCESSING (NLP)

What It Is:

NLP is the branch of AI that enables machines to understand, interpret, and generate human language. It combines linguistics and machine learning to help computers make sense of written and spoken words.

NLP Architecture



How It Helps:

Tools like Siri, Alexa, and ChatGPT use NLP to interpret user commands, hold conversations, and answer questions naturally – transforming how we interact with technology using our own language.





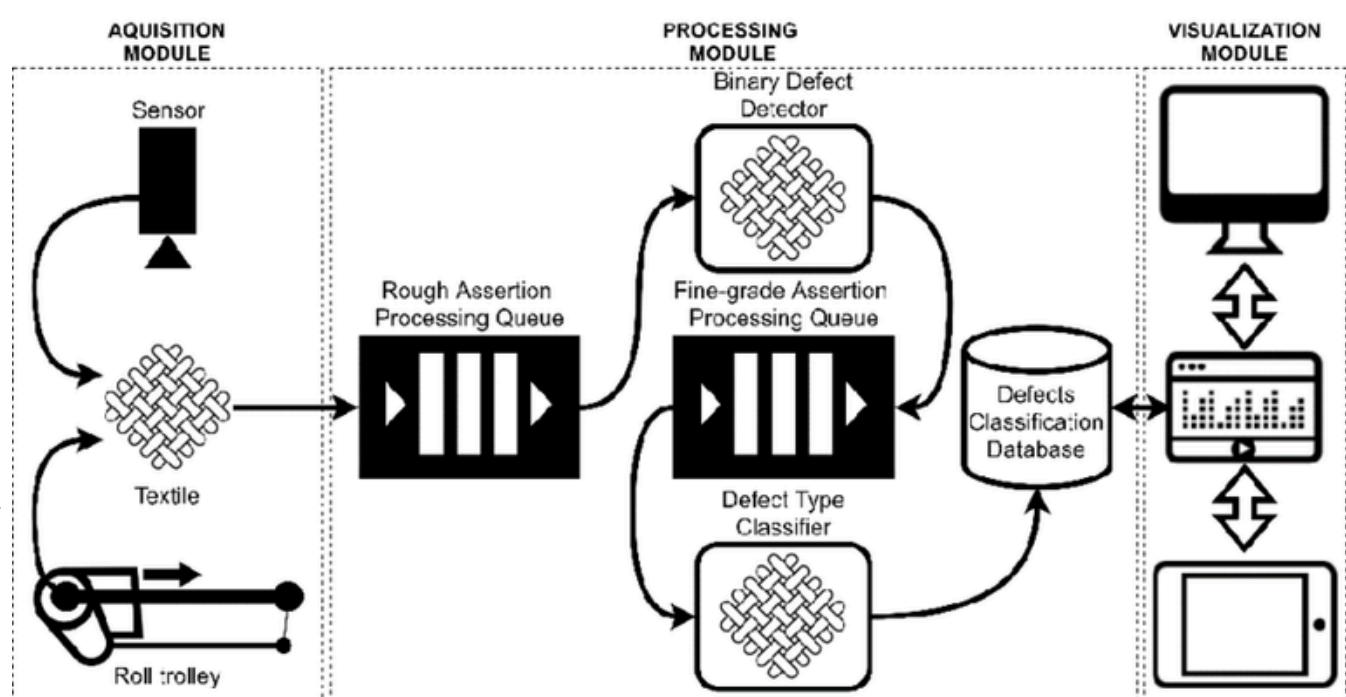
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2. COMPUTER VISION

What It Is:

Computer Vision gives machines the ability to "see" and interpret images or videos. It mimics human visual understanding using neural networks trained on visual data.

CV Architecture



How It Helps:

Self-driving cars use Computer Vision to identify traffic signs, pedestrians, and lane lines – enabling them to navigate roads autonomously and safely.





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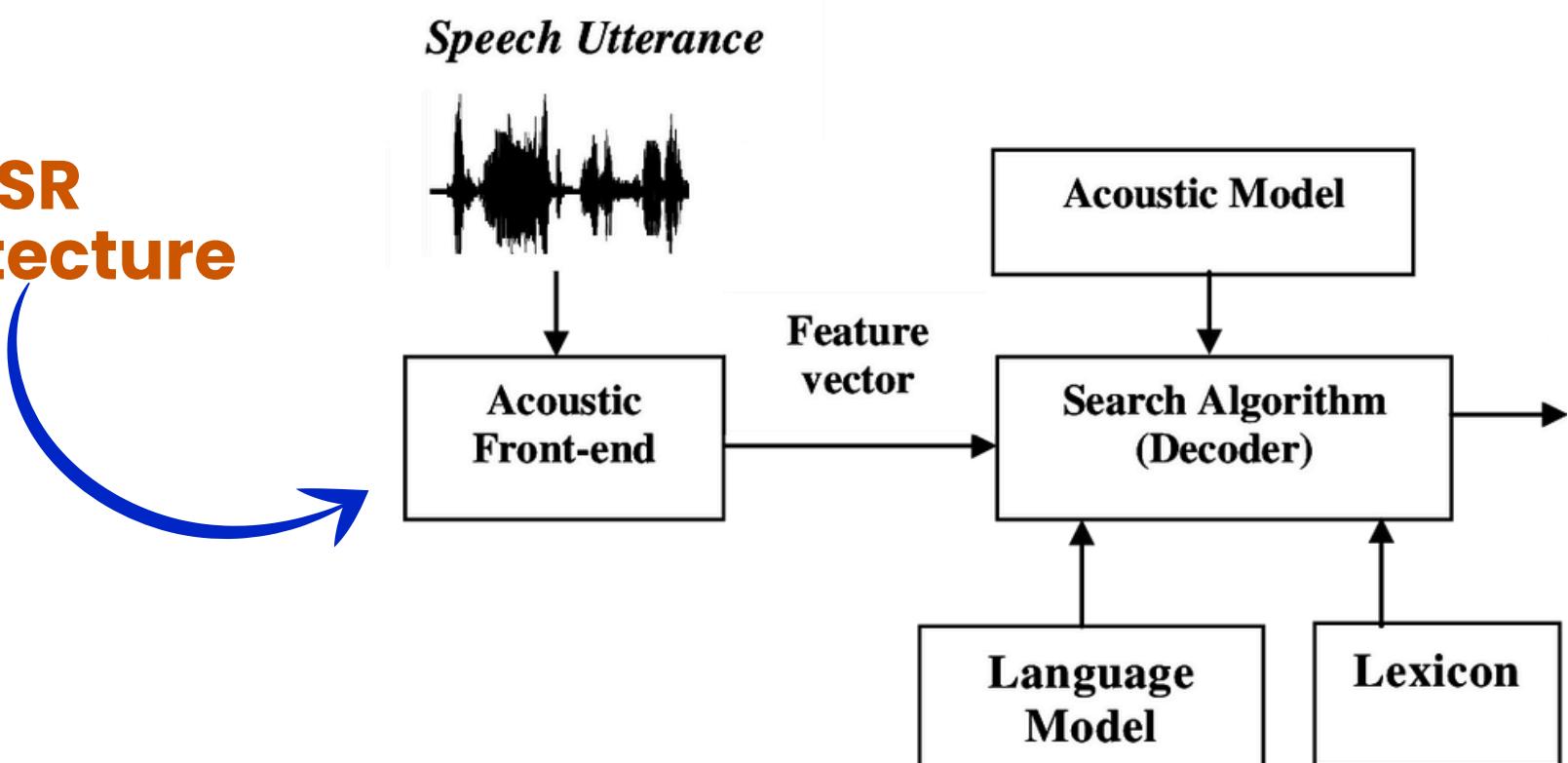
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3. SPEECH RECOGNITION

What It Is:

Speech Recognition technology converts spoken language into written text. It's the foundation behind voice-activated systems and AI transcription services.

ASR Architecture



How It Helps:

Platforms like Otter.ai and Zoom AI Companion transcribe meetings and calls in real time – improving documentation, accessibility, and productivity.





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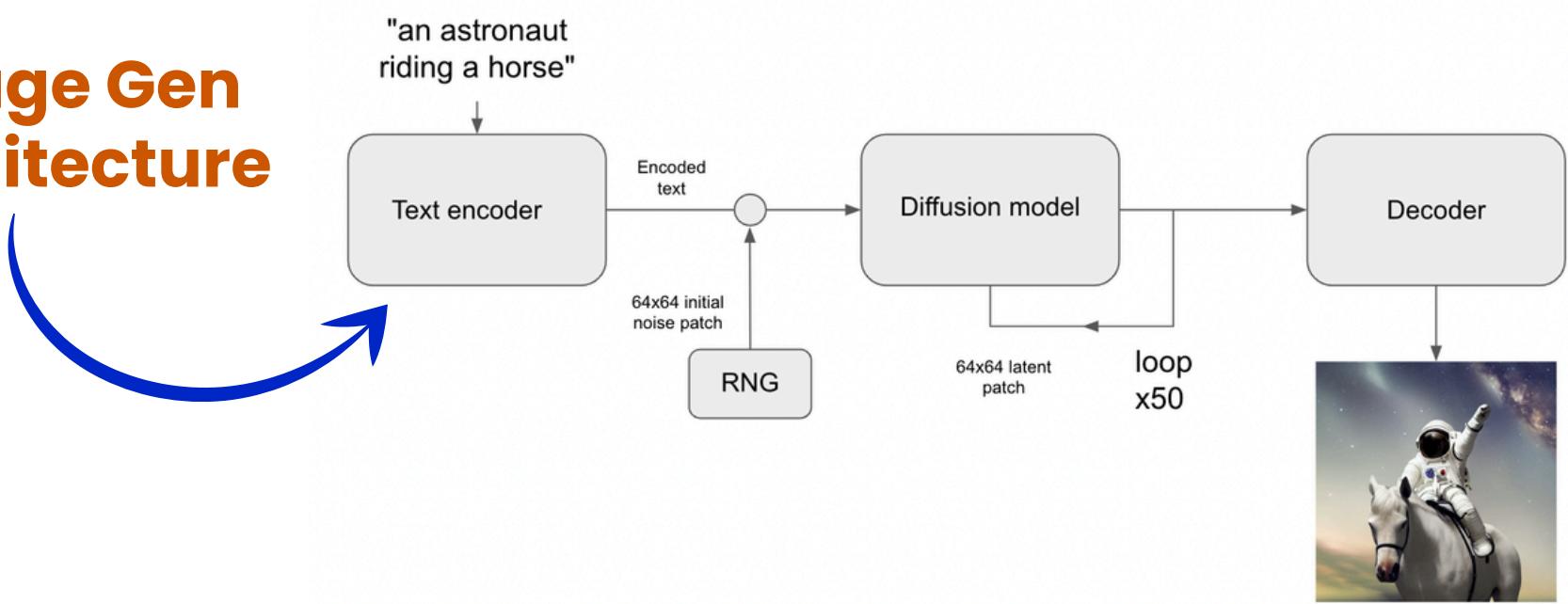
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4. IMAGE GENERATION (VIA DIFFUSION MODELS)

What It Is:

Image generation models like DALL·E and Stable Diffusion create original images from textual descriptions by progressively refining visual noise into structured visuals.

Image Gen Architecture



How It Helps:

Designers use tools like Midjourney to instantly generate brand concepts, art, and mockups - speeding up creative workflows with just a text prompt.





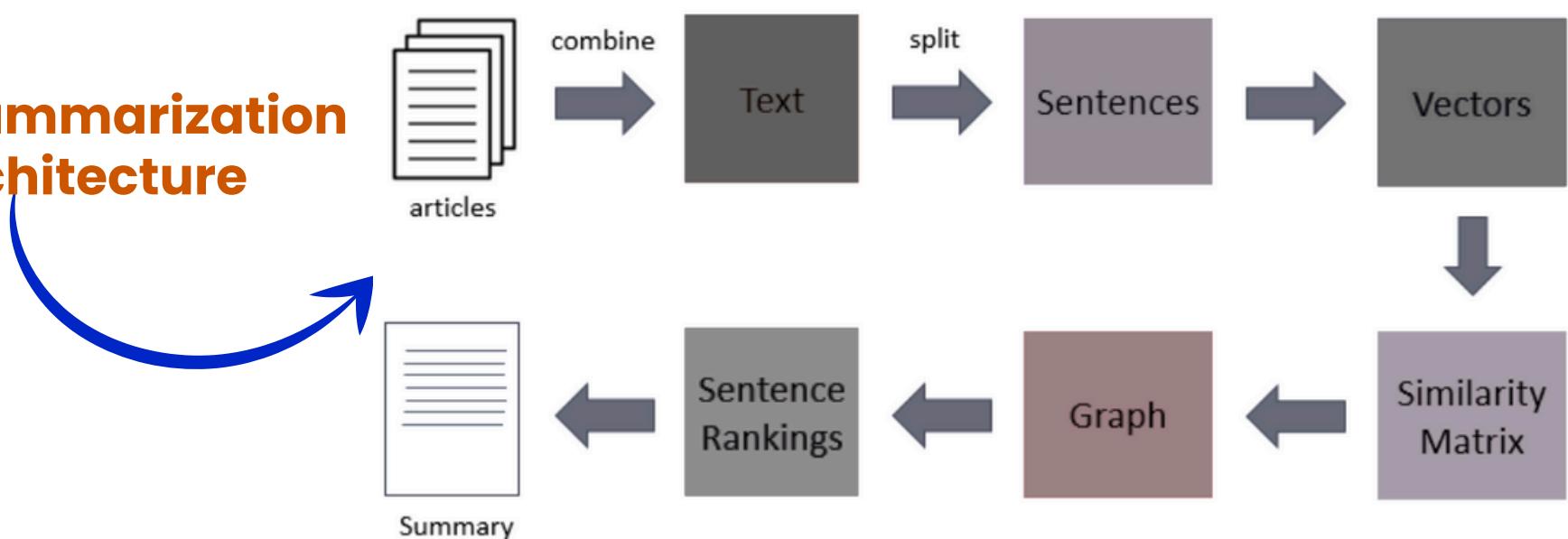
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5. TEXT SUMMARIZATION

What It Is:

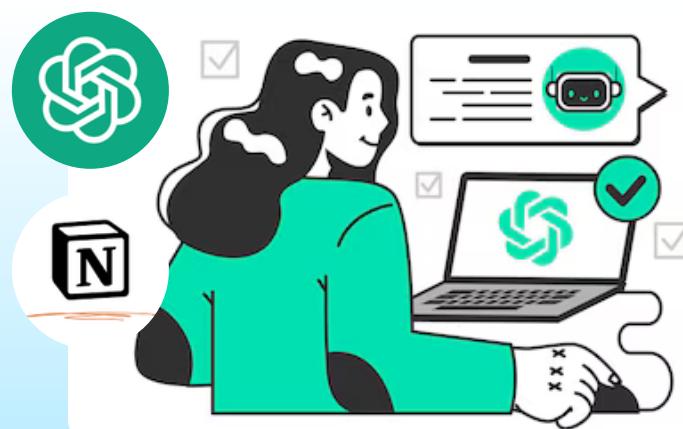
Text summarization condenses large pieces of content into brief, meaningful summaries using NLP techniques such as extractive or abstractive summarization.

Text Summarization Architecture



How It Helps:

Professionals use ChatGPT or Notion AI to summarize reports, articles, or meeting notes – saving hours of reading while preserving key insights.





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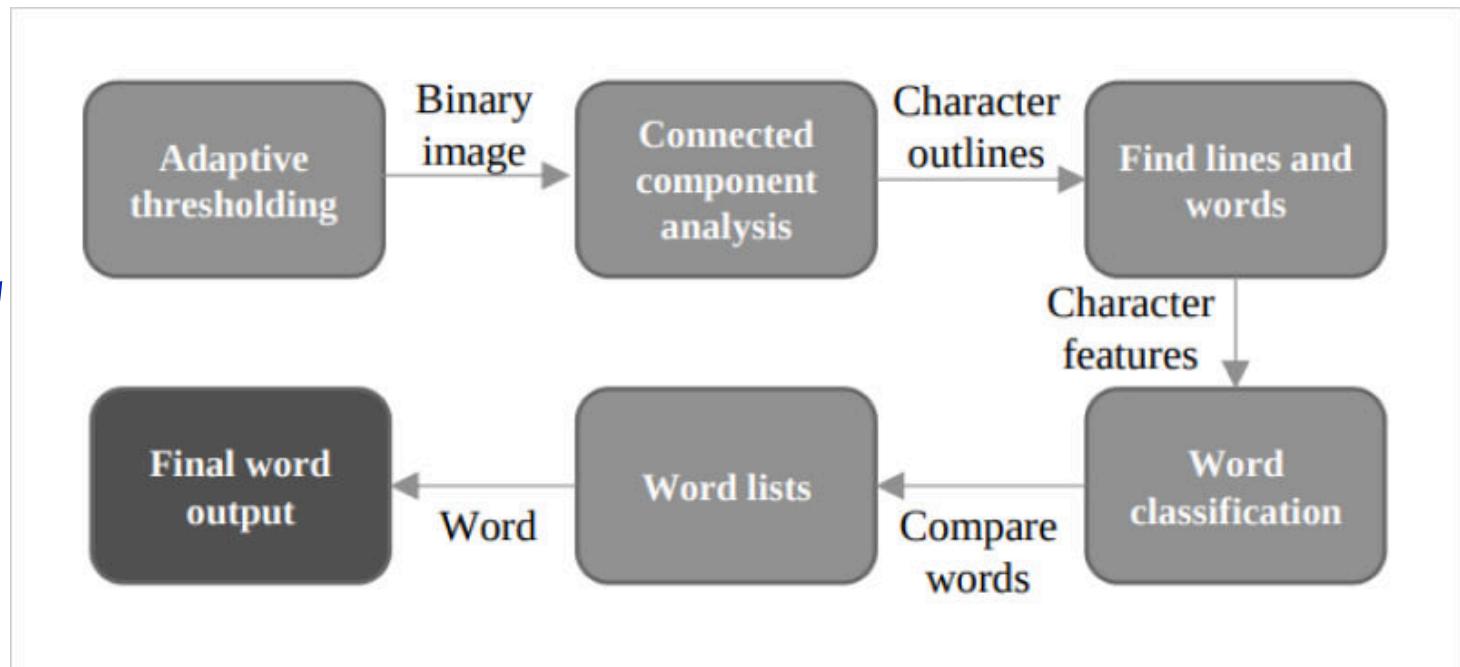
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6. OPTICAL CHARACTER RECOGNITION (OCR)

What It Is:

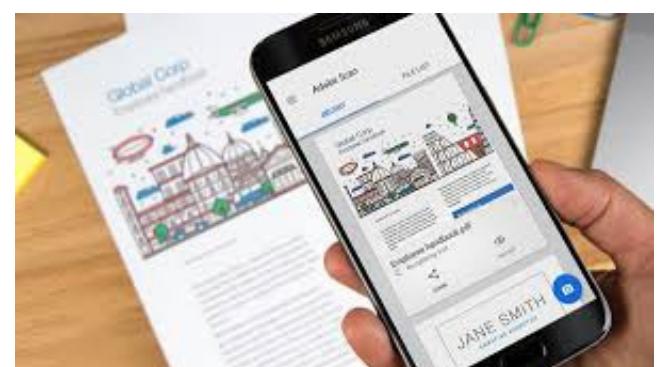
OCR allows AI systems to recognize and convert printed or handwritten text in images into editable, searchable text formats.

OCR Architecture



How It Helps:

Google Lens or Adobe Scan can instantly convert scanned documents, invoices, or receipts into digital text — automating data entry and archiving.





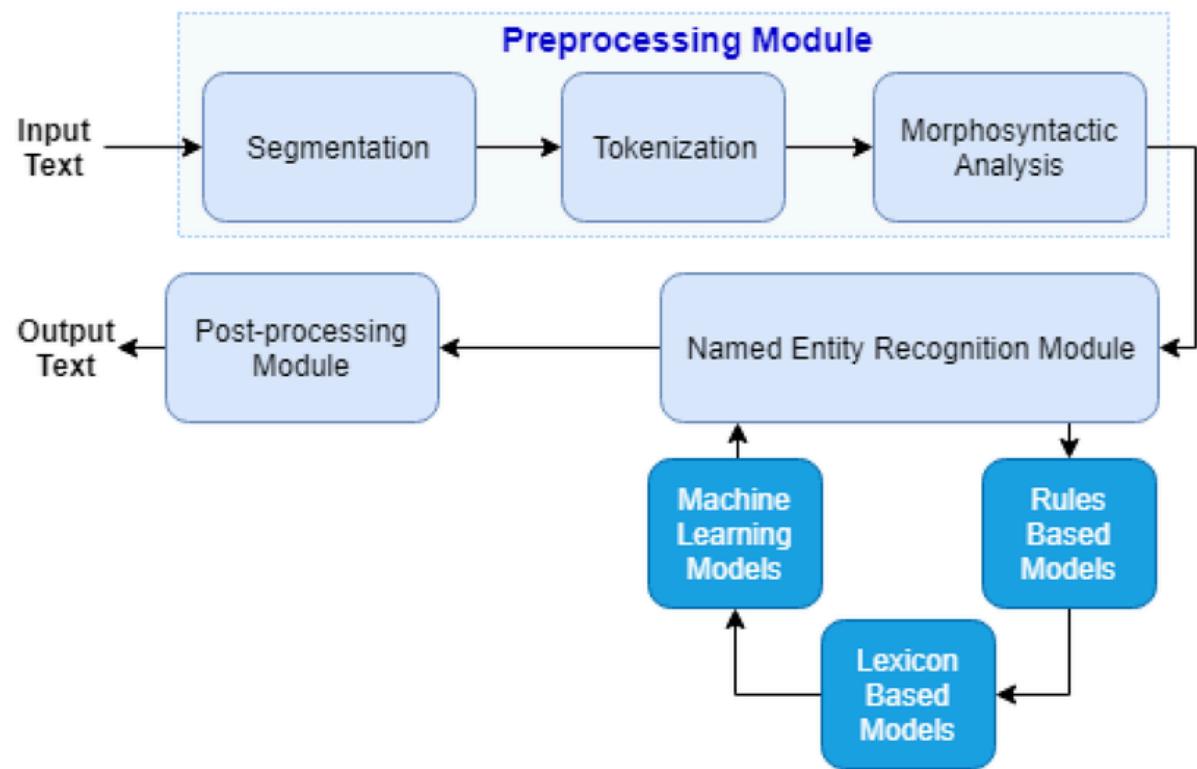
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7. NAMED ENTITY RECOGNITION (NER)

What It Is:

NER is an NLP technique that identifies and classifies key entities in text such as names of people, locations, dates, or organizations.

NER Architecture



How It Helps:

Legal AI platforms use NER to extract parties, deadlines, and clauses from contracts – streamlining document review and risk assessment.





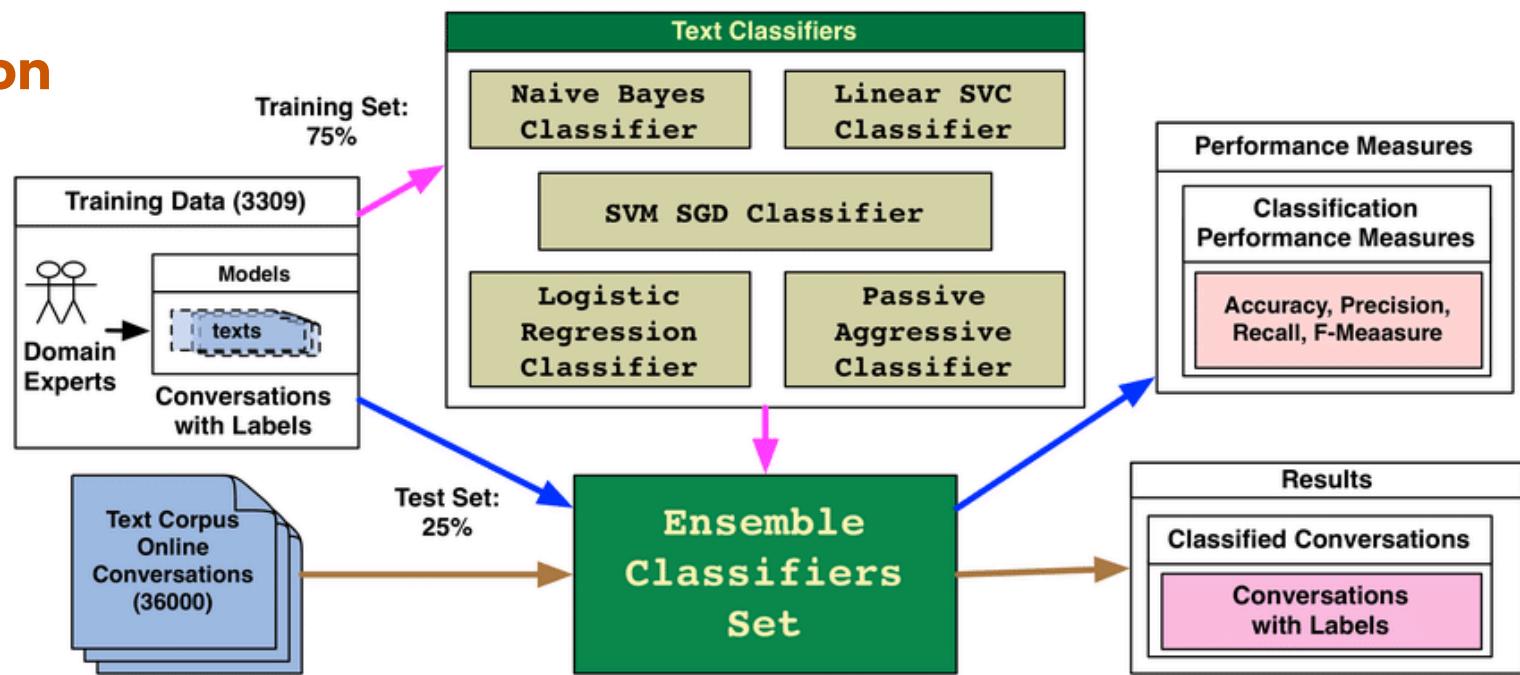
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8. TEXT CLASSIFICATION

What It Is:

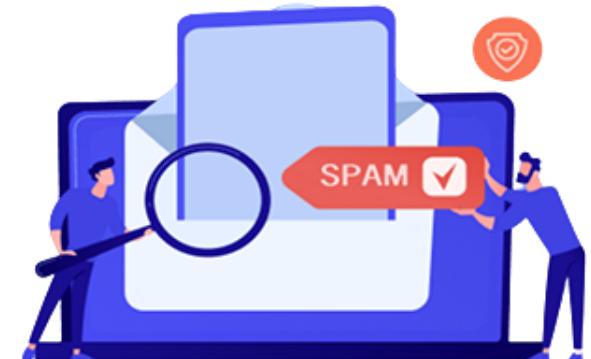
Text Classification involves categorizing text into predefined labels using AI. It's commonly used to analyze sentiment, detect spam, or organize information.

Text Classification Architecture



How It Helps:

Email providers classify messages as spam or priority, while social platforms detect hate speech or misinformation using AI-driven classifiers.





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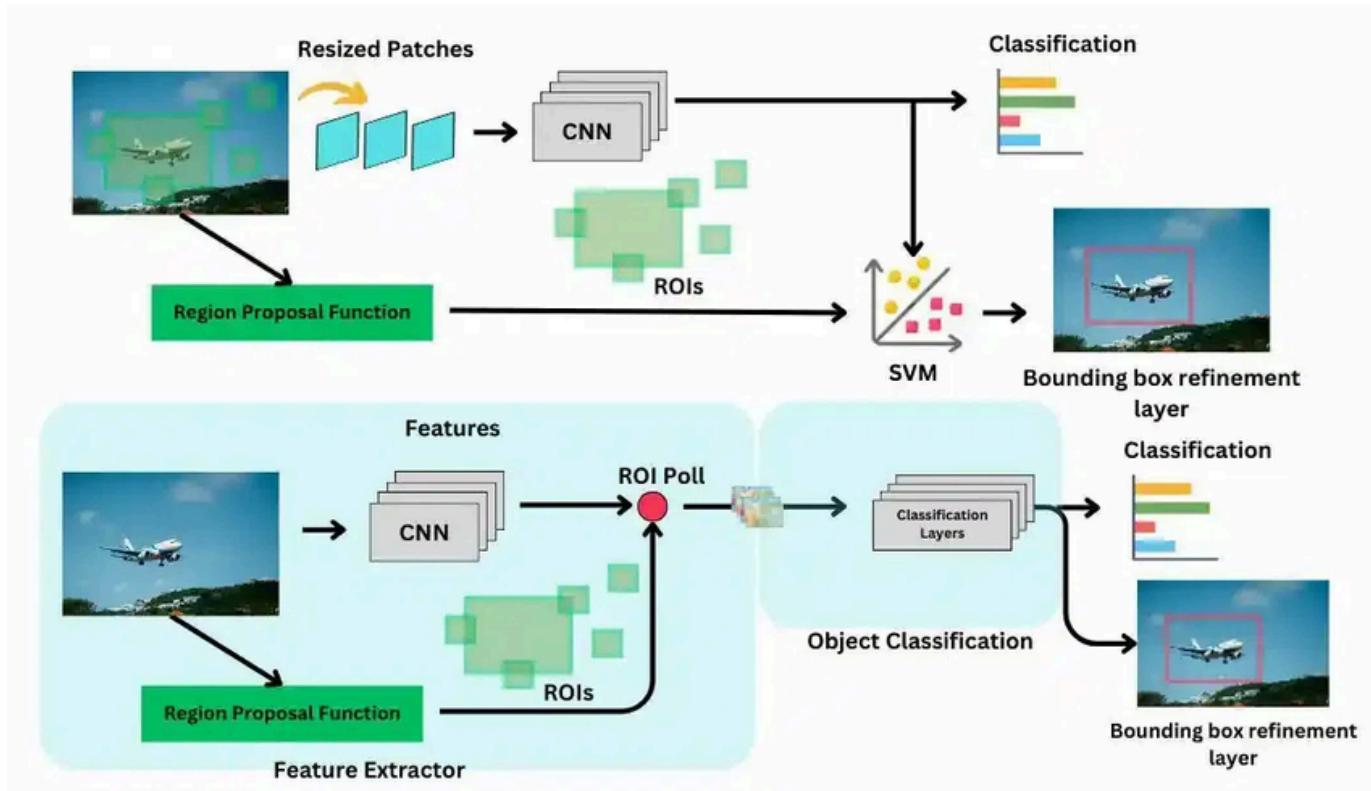
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9. OBJECT DETECTION

What It Is:

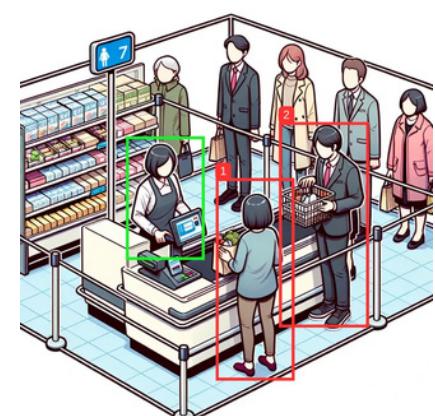
Object Detection locates and identifies multiple objects within an image or video stream. It goes beyond simple classification by pinpointing object positions.

Object Detection Architecture



How It Helps:

Retail stores use Object Detection to monitor inventory or track customer movement in-store, optimizing product placement and security.





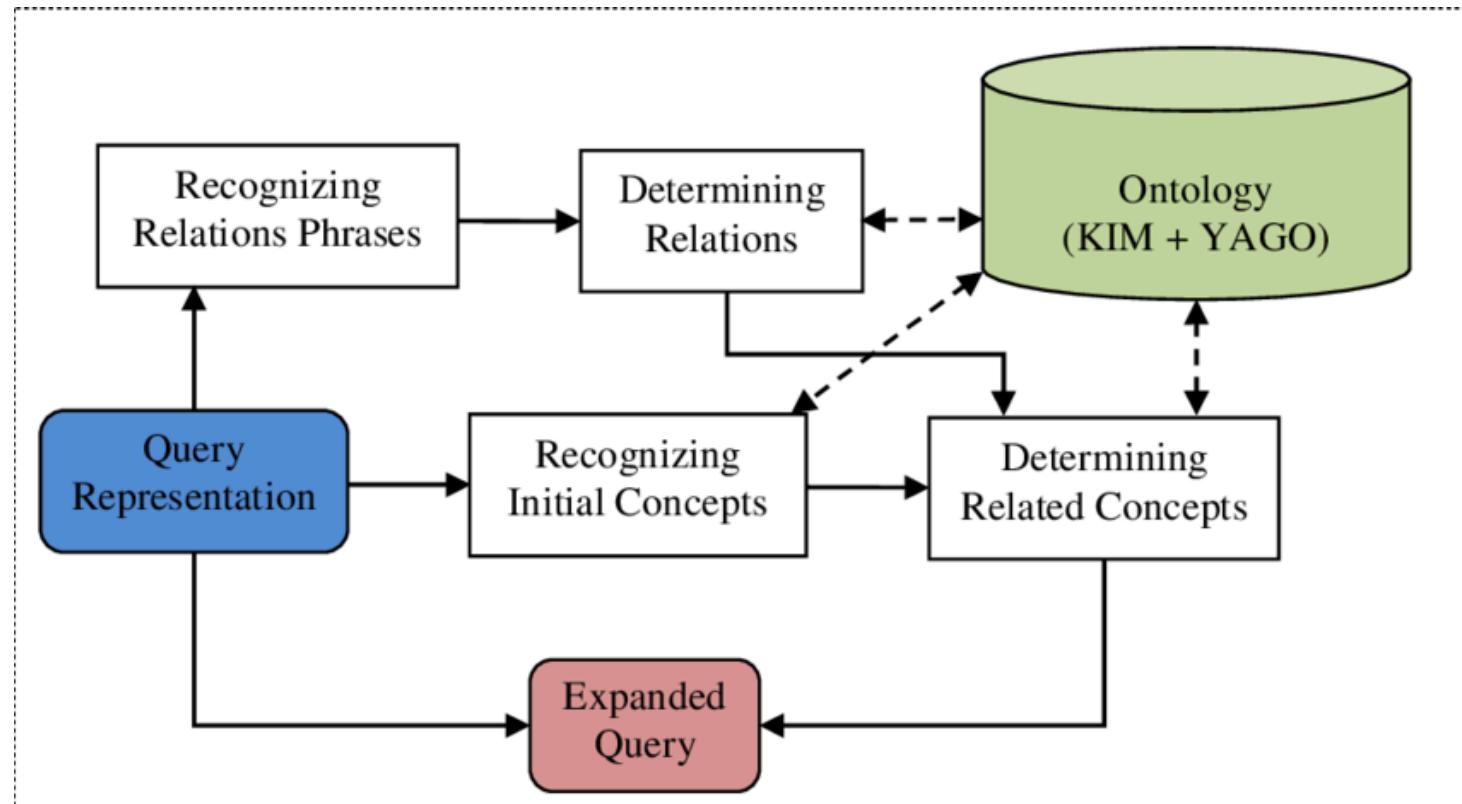
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10. SEMANTIC SEARCH

What It Is:

Semantic Search uses embeddings and language models to understand the meaning behind a query rather than matching exact words.

Semantic Search Architecture



How It Helps:

Chatbots and AI tools like Notion AI and RAG-based systems answer complex user queries by searching and summarizing across documents intelligently.





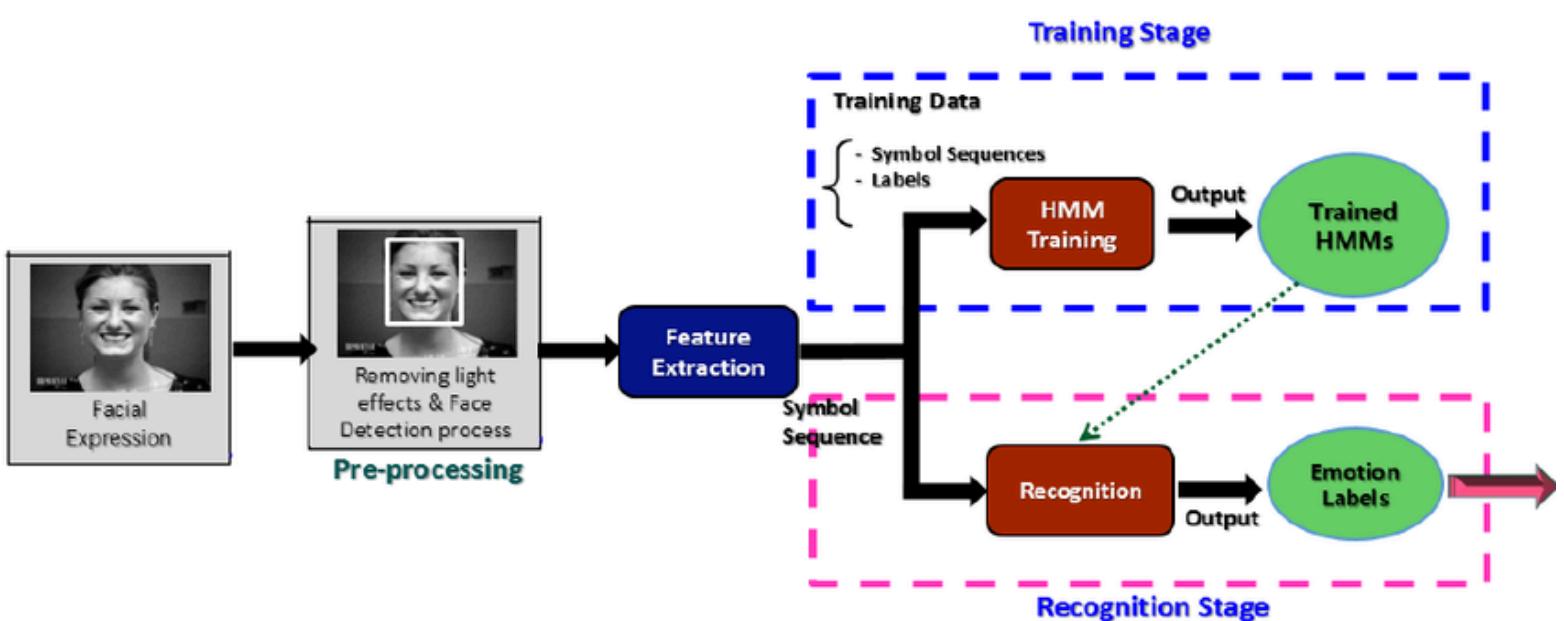
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12. EMOTION RECOGNITION

What It Is:

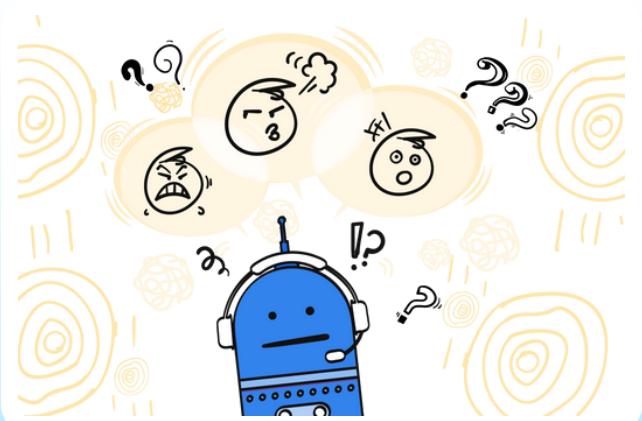
Emotion Recognition identifies human emotions from facial expressions, voice tone, or written text using AI models trained on emotional cues.

Emotion Recognition Architecture



How It Helps:

Customer service systems use this to detect frustration in voices or chats and escalate issues to human agents before customers churn.





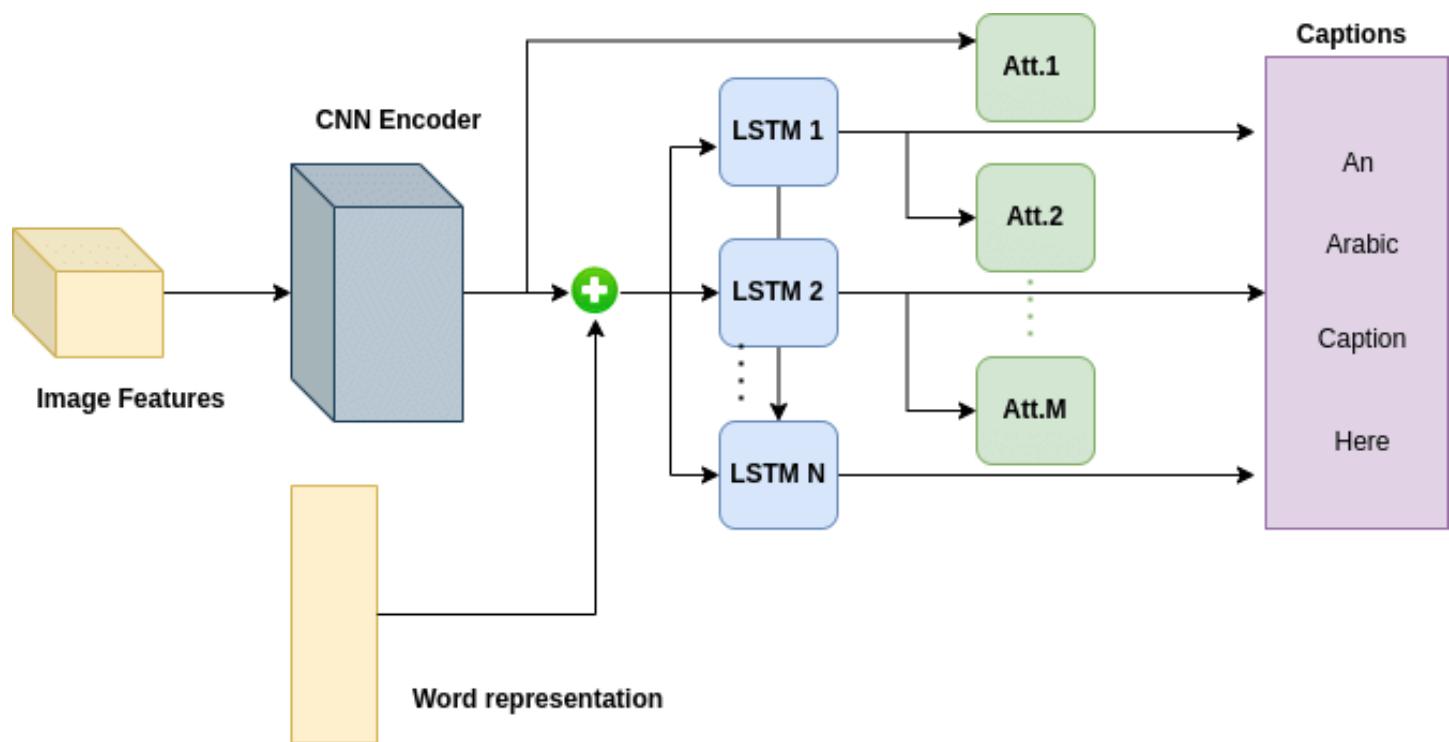
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13. IMAGE CAPTIONING

What It Is:

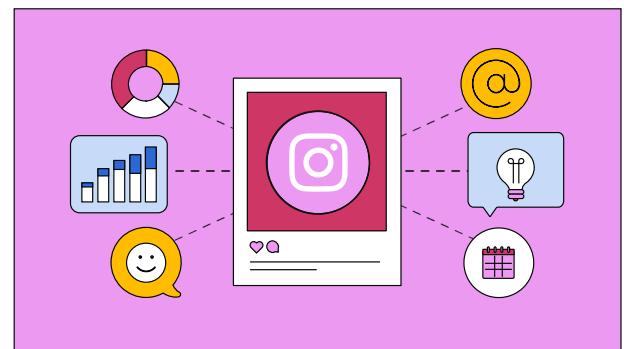
Image Captioning uses Computer Vision and NLP to generate natural language descriptions for images, making visual content accessible and searchable.

Image Captioning Architecture



How It Helps:

Instagram and accessibility apps use image captioning to provide alt-text for the visually impaired and improve SEO on visual content.





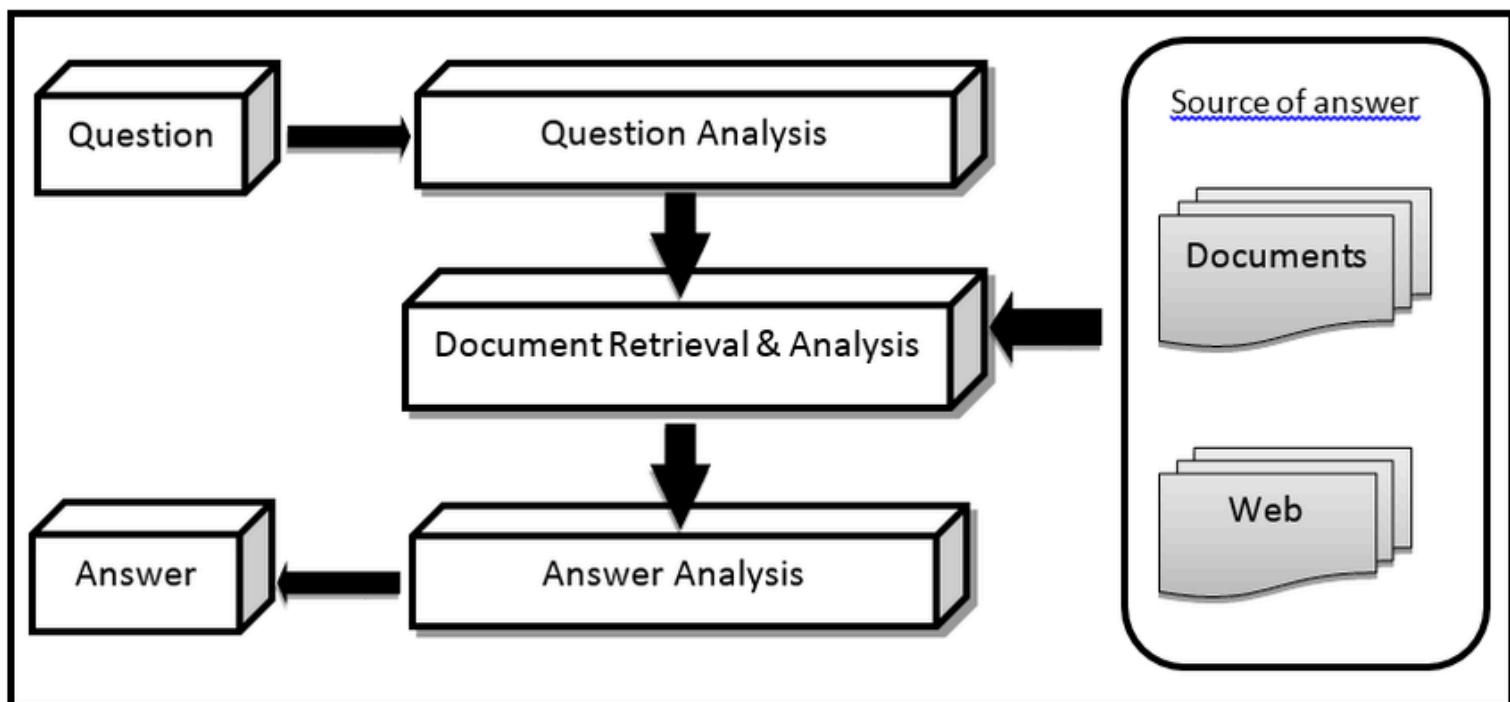
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14. QUESTION ANSWERING

What It Is:

QA systems allow AI to read documents and directly answer user questions based on the available context.

Question Answering Architecture



How It Helps:

Enterprise chatbots can instantly answer employee queries by pulling information from HR handbooks, policies, or knowledge bases.



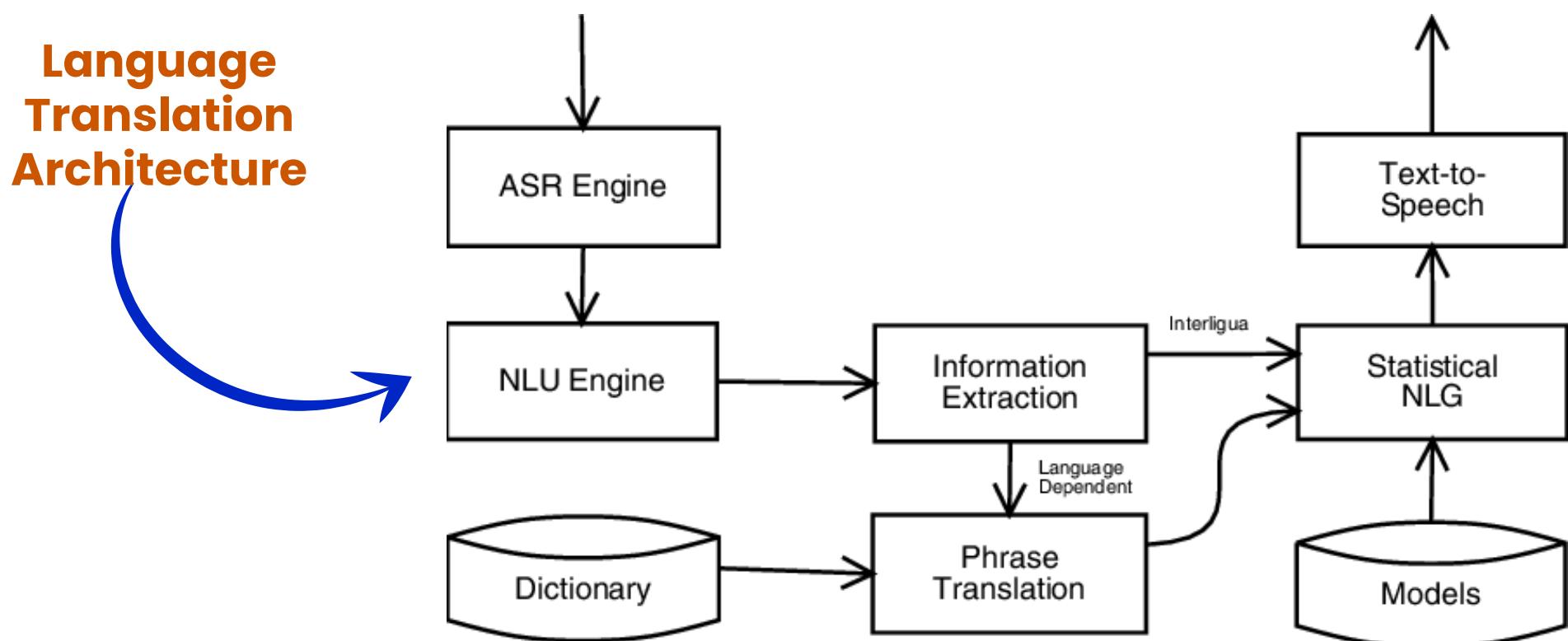


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15. LANGUAGE TRANSLATION (MULTILINGUAL NLP)

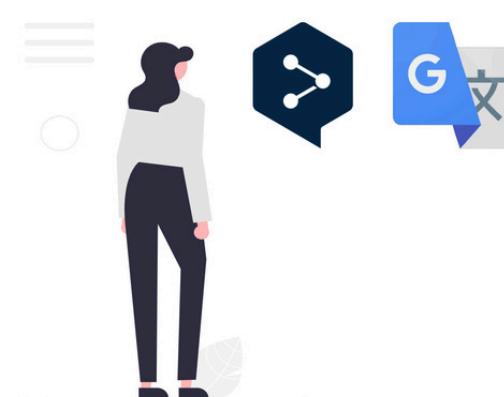
What It Is:

Language Translation AI converts text from one language to another, preserving tone and meaning, often in real time.



How It Helps:

Tools like Google Translate and DeepL break down language barriers in travel, customer support, and global collaboration.





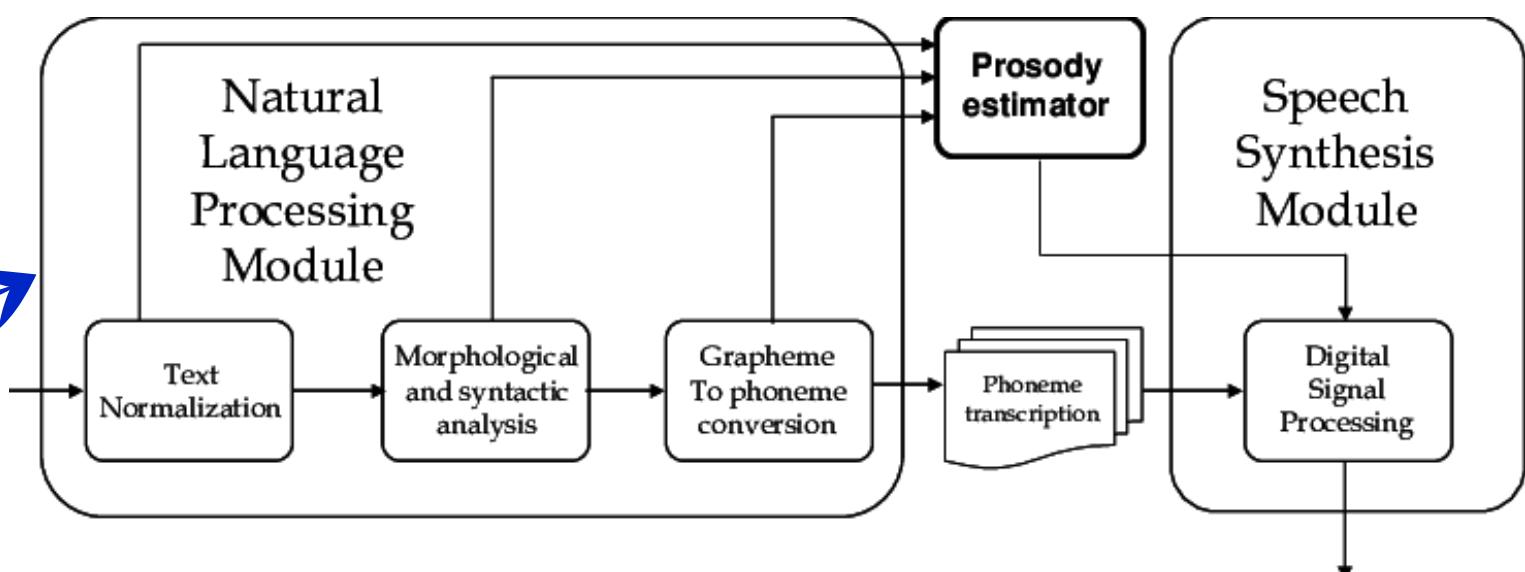
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16. TEXT-TO-SPEECH (TTS)

What It Is:

TTS systems transform written content into spoken voice using AI-trained models that can mimic human speech patterns, tone, and emotion.

TTS Architecture



How It Helps:

Platforms like ElevenLabs and Apple VoiceOver help visually impaired users, power audiobooks, and enable AI voice avatars.





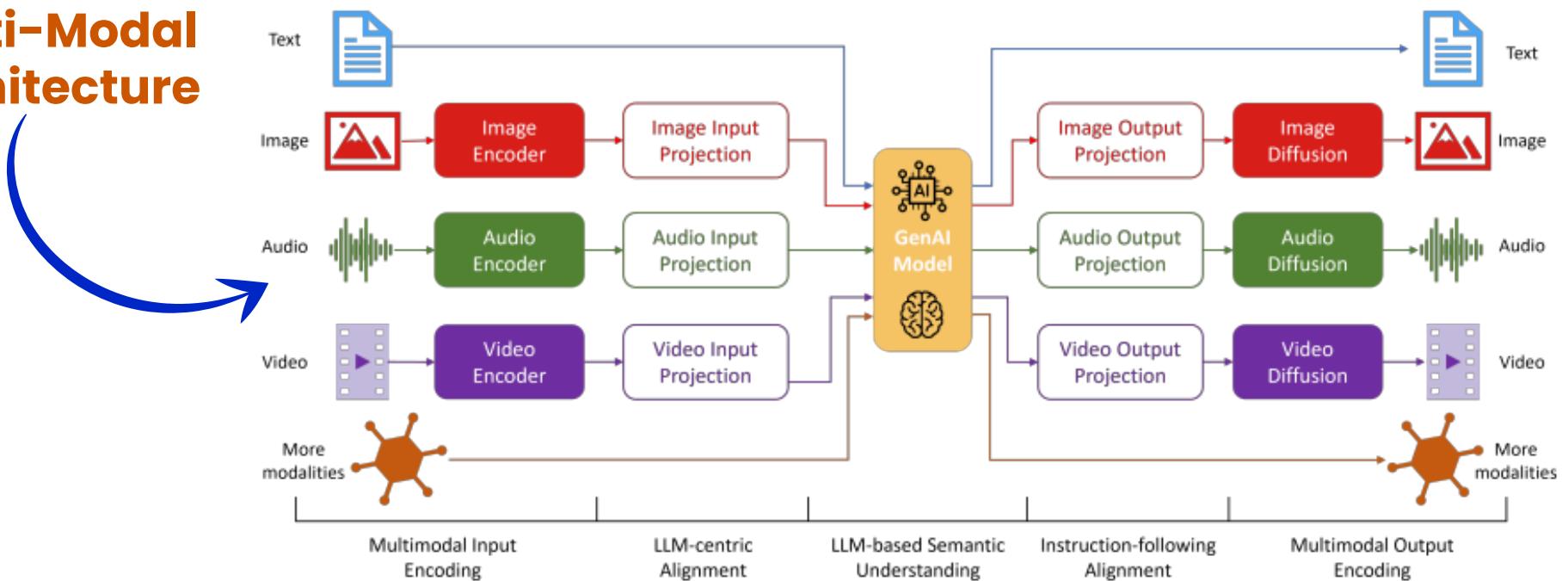
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17. MULTI-MODAL AI

What It Is:

Multi-modal AI processes and combines multiple types of data like text, images, audio, and video in a single model.

Multi-Modal Architecture



How It Helps:

GPT-4o and Gemini 1.5 understand images, voice, and text — enabling users to upload a chart and ask questions about it in natural language.



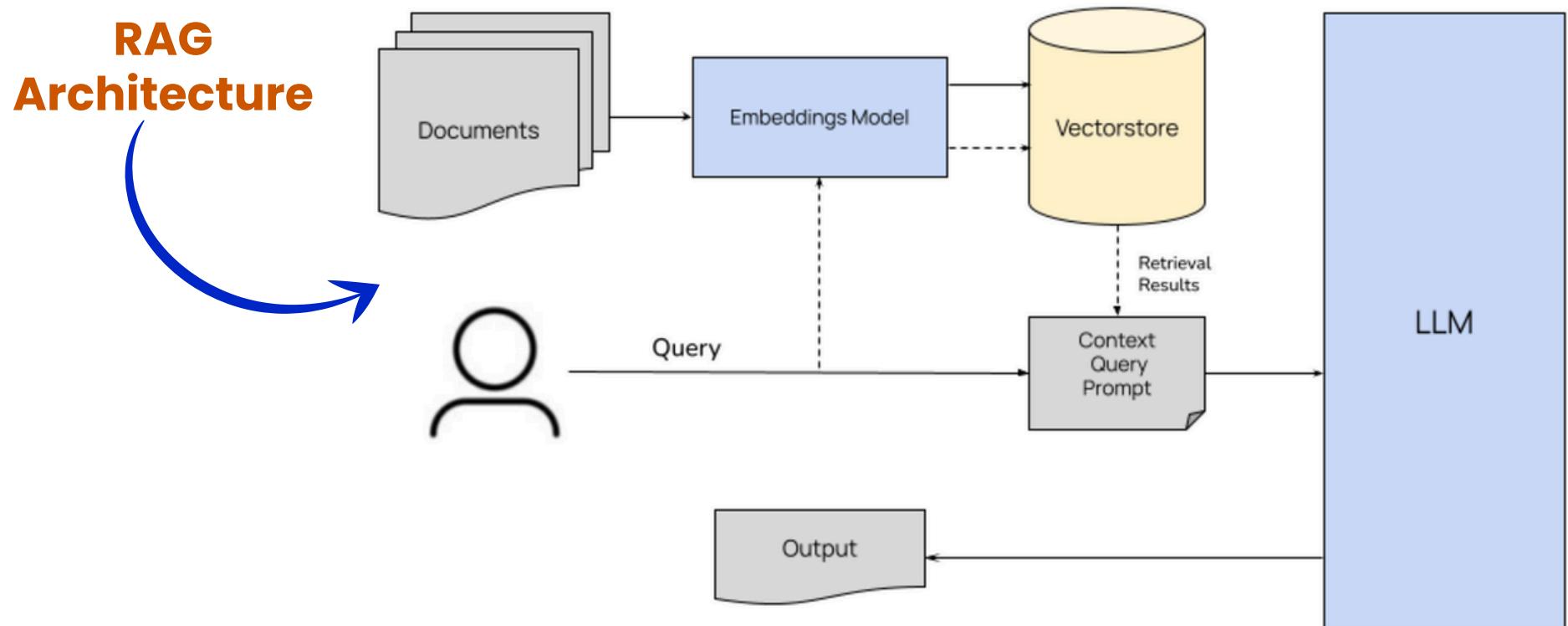


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18. RETRIEVAL-AUGMENTED GENERATION (RAG)

What It Is:

RAG enhances language models by pulling relevant context from external sources before generating a response.



How It Helps:

Enterprise chatbots answer complex policy or legal queries by retrieving relevant PDFs and citing them in responses.





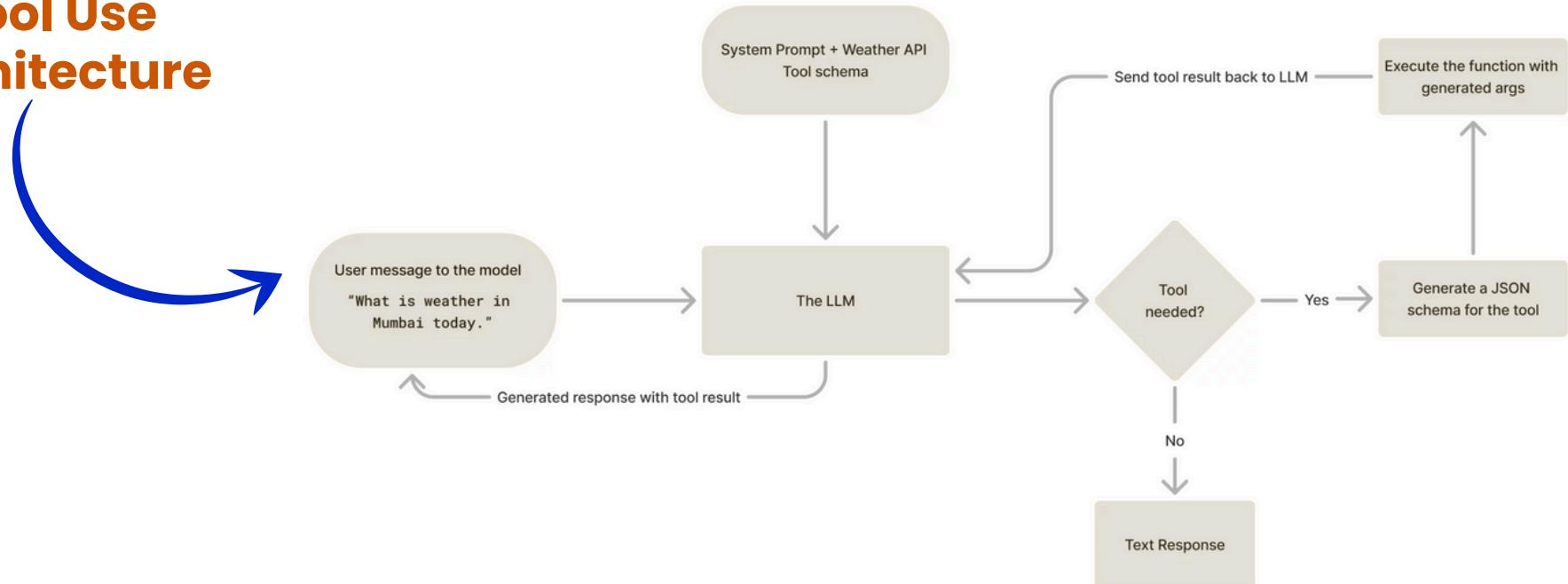
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19. TOOL USE / FUNCTION CALLING

What It Is:

AI models use external tools, APIs, or calculators to get real-time answers or perform actions they can't do internally.

Tool Use Architecture



How It Helps:

ChatGPT + Code Interpreter can calculate formulas, analyze CSV files, or fetch live data through APIs.





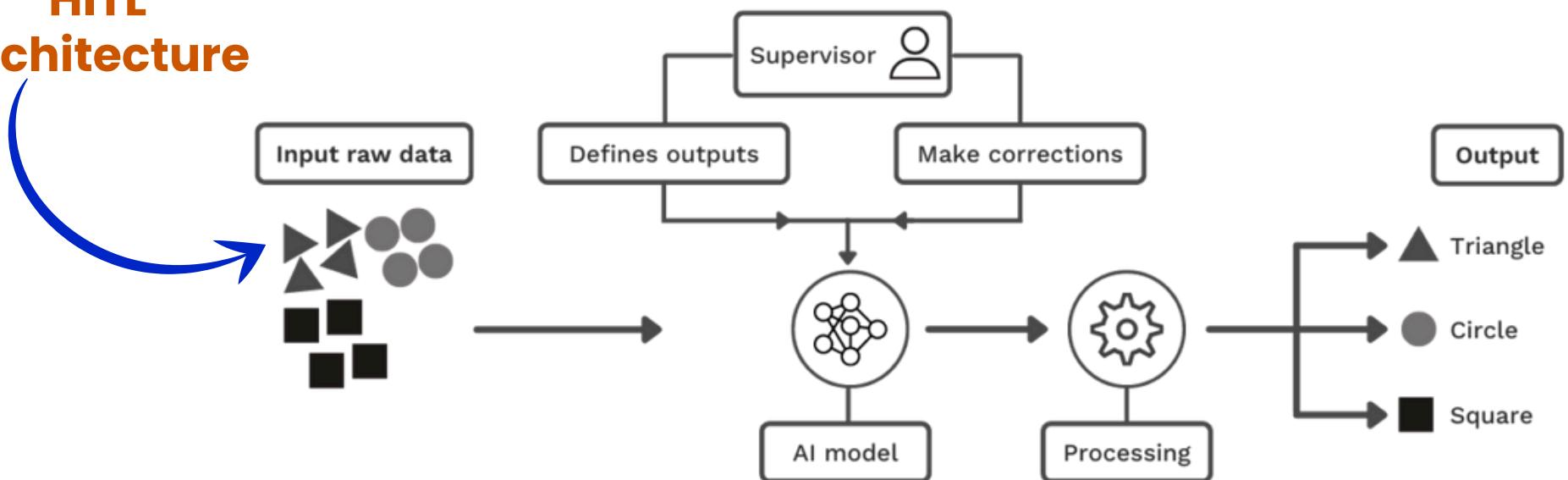
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20. HUMAN-IN-THE-LOOP (HITL)

What It Is:

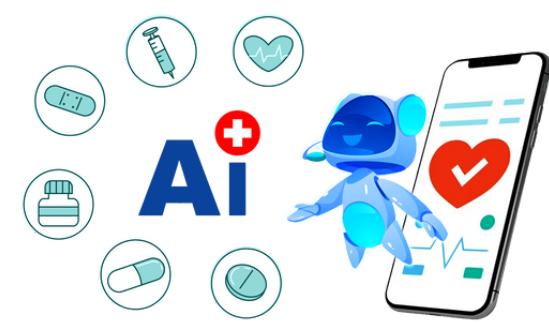
HITL is when human judgment is integrated into an AI workflow to validate or override outputs — crucial for safety-critical systems.

HITL Architecture



How It Helps:

In healthcare or finance, human reviewers approve or reject AI-suggested diagnoses or transactions before action is taken.





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