THE MODERNAI RESURGENCE

- The 1990s brought advances in computational power, data availability, and improved algorithms.
- Practical applications emerged, such as speech recognition and search engines.
- **1997:** IBM's Deep Blue defeated world chess champion Garry Kasparov.

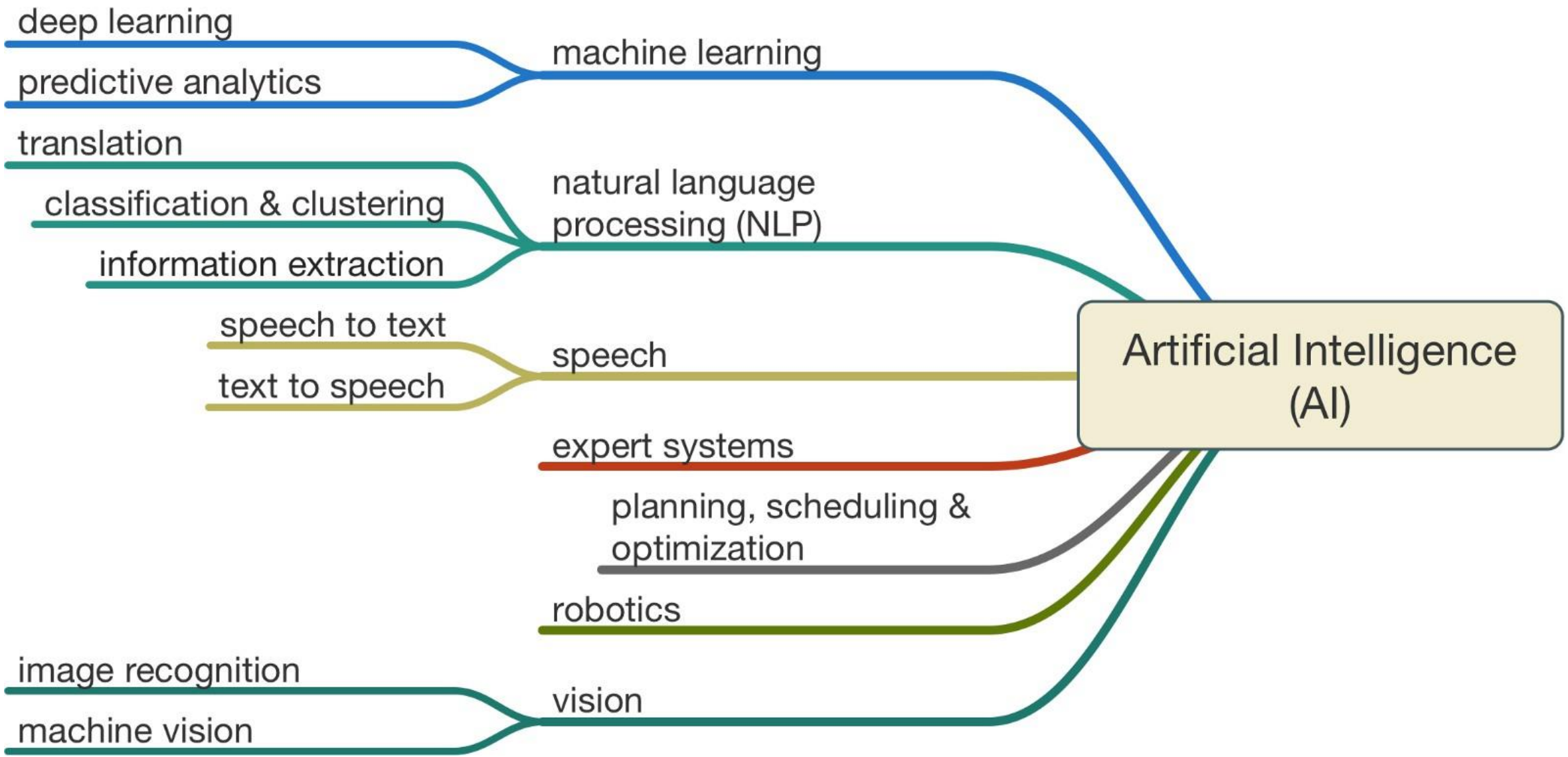
- AI achieved breakthroughs in specialized domains, marking a significant revival of interest.

THE DEEP LEARNING REVOLUTION

- Neural networks and access to large-scale data led to advancements in image recognition, language processing, and autonomous systems.
- AI systems like Google Assistant and ChatGPT became part of everyday life.

AI TECHNIQUES OVERVIEW

- AI methodologies include:
  - **Symbolic AI:** Rule-based systems using explicit logic.
  - **Machine Learning (ML):** Data-driven approaches to identify patterns and make decisions.
  - **Deep Learning:** Neural networks with multiple layers for complex tasks.
  - **NLP:** Interacting through human language.
  - **Computer Vision:** Processing and analyzing visual data.
  - **Robotics:** Intelligent machines in real-world environments.


Artificial Intelligence (AI)
machine learning
deep learning
predictive analytics
natural language processing (NLP)
translation
classification & clustering
information extraction
speech
speech to text
text to speech
expert systems
planning, scheduling & optimization
robotics
vision
image recognition
machine vision

SYMBOLIC AI

- Relies on predefined rules and explicit logic to encode knowledge.
- **Strength:** High interpretability and transparency.
- **Limitation:** Ineffective at handling unstructured or complex real-world data.

MACHINE LEARNING

- ML algorithms learn patterns from data to make predictions or decisions.
- Types:
  - **Supervised Learning:** Uses labeled data (e.g., spam detection).
- **Unsupervised Learning:** Identifies patterns in unlabeled data (e.g., customer segmentation).
  Reinforcement Learning: Agents learn through trial and error to achieve goals.
  - Example: Game-playing AI like AlphaGo.
- ML forms the backbone of many modern AI applications.

DEEP LEARNING

- Subset of ML using neural networks with multiple layers to process complex data.
- Applications:
  - Medical diagnostics (e.g., identifying diseases from X-rays).
  - Autonomous driving (e.g., recognizing road signs and obstacles).

NATURAL LANGUAGE PROCESSING (NLP)

- Enables machines to understand, interpret, and generate human language.
- Applications:
  - Chatbots and virtual assistants (e.g., ChatGPT, Alexa).
  - Sentiment analysis for social media and product reviews.
  - Machine translation (e.g., Google Translate).

COMPUTER VISION

- Allows AI to interpret visual data like images or videos.
- Applications:
  - Facial recognition for security and authentication.
  - Object detection in autonomous vehicles.
  - Augmented reality for gaming and training.

ROBOTICS

- Combines AI with physical systems for interaction with the environment.
- Applications:
  - Autonomous vehicles and drones.
  - Robotic manufacturing in industries.
  - Humanoid robots for caregiving and assistance.