



Emerging Artificial Intelligence

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What Types of AI Exist Today?

- **Narrow AI**
 - Also known as Weak AI and Artificial Narrow Intelligence (ANI)
 - Exists today
 - Performs a single (narrow) task very fast
- **General AI**
 - Artificial General Intelligence (AGI)
 - Currently theoretical
- **Super AI**
 - Theoretical/sci-fi (may never exist)

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Types of Narrow AI (ANI)

- **Image recognition**
 - Identify objects and features
 - Facial recognition
- **Voice assistants**
 - Siri and Alexa
- **Generative AI**
 - Chat Bots
 - ChatGPT (Generative Pre-trained Transformer)
 - Use Large Language Models (LLM)

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Mistakes are Common

What is the primary ignition source of wildfires?

The primary ignition source for wildfires is lightning, which is a natural cause. However, human activities, such as unattended campfires and arson, account for nearly 85% of wildfires in the United States. [National Park Service](#) [Wikipedia](#)

Do humans cause the majority of wildfires?

Humans cause wildfires primarily through activities such as unattended campfires, discarded cigarettes, burning debris, and intentional acts like arson. Approximately 85% of wildfires in the United States are attributed to human actions. [HowStuffWorks](#) [National Park Service](#)

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AI Hallucinations

- Mistakes or incorrect output



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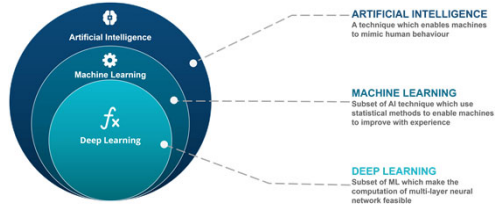
Is AI New?

- One of the earliest **Machine Learning** algorithms was an Artificial Neural Network (ANN) developed in 1958
 - The Perceptron developed by psychologist Frank Rosenblatt
- Numerous advances and applications in image recognition (classification) were developed in the 1990's
 - Multi-layer Perceptron (MLP)
 - Convolution Neural Network (CNN) **Deep Learning**
 - Classification Tree and Decision Forests are types of **Machine Learning**

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AI, Machine Learning, and Deep Learning



Source <https://www.edureka.co/blog/wp-content/uploads/2018/03/AI-vs-ML-vs-Deep-Learning.png>

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ML & DL

	Machine Learning	Deep Learning
Definition	Computer systems that learn from data to make predictions and decisions.	A subset of machine learning that leverages layer(s) of artificial neural networks to recognize complex patterns.
Data	Machine Learning works well with smaller, structured datasets.	Requires substantial / large amounts of data
Processing	Less computationally intense.	High computation needs; deep learning can often require Graphics Processing Units (GPUs) or Tensor Processing Units (TPUs).
User Input	More user input before processing.	Minimal user input, but heavy development and engineering effort(s) required.

Source GEOTalks 2025

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Remote Sensing Image Classification

- Common application in GIS
- Originally Unsupervised Classifiers were used
 - Clustering based on spectral signatures
- Later, single iteration Supervised Classifications were developed
 - Pixels that match the mean value of a training pixel were considered the same class as the training pixel
 - Minimum Distance to Mean, Parallelepiped, and Maximum Likelihood

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Today...

- More advanced ML and DL (AI (ANI)) classifiers are the norm
- Can create accurate models of the real world
 - Importance of good training data
 - Independent Validation is very important
 - Beware over-fitted models

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Beyond Classification

- Object/feature extraction
 - Sidewalks
 - Utility poles
 - Structures
 - Tree canopies

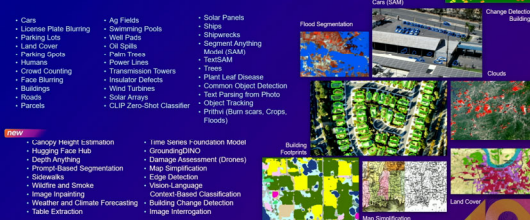


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Pre-Trained AI Models for ArcGIS Pro

Pretrained GeoAI Models



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AI Concerns and Ethics

- Use Cases
 - Privacy fence
 - County assessors
- Energy consumption (ROI?)
- Bill of Rights and the Fourth amendment
- Patriot Act of 2001
- Gorgon Stare and Wide Area Motion Imagery (WAMI)

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Rise of Palantir

- Began by Peter Thiel (PayPal) in 2003
- Three primary components
 - Foundry (data mining, analytics, and logistics commercially provided as SaaS)
 - Gotham (government users intelligence, surveillance, etc.)
 - Apollo (real-time updates and platform management)
- Integrated and connected with their AIP
- Growing rapidly (e.g., \$10B US Army Contract July 2025)

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In My Lifetime

- I warned others about it, but never thought it would happen in my lifetime...

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Key Concepts

- AI is an emerging and rapidly advancing technology
- Today, narrow AI (ANI) is the primary focus
- Numerous spatial applications
- Ethical considerations must not be overlooked

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Questions?

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