



Artificial Intelligence

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What does this image mean for you?



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Artificial Intelligence

- What is **intelligence**?
- **Intelligence** is the ability to accomplish complex goals.
- What is **artificial intelligence**?
- **AI** is non-biological intelligence.
- **AI is possible**: Intelligence doesn't require flesh, blood or carbon atoms (Tegmark 2017).

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The Rise of AI?



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IBM Deep Blue and IBM Watson



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Google DeepMind AphaGo

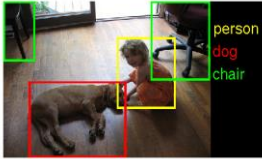


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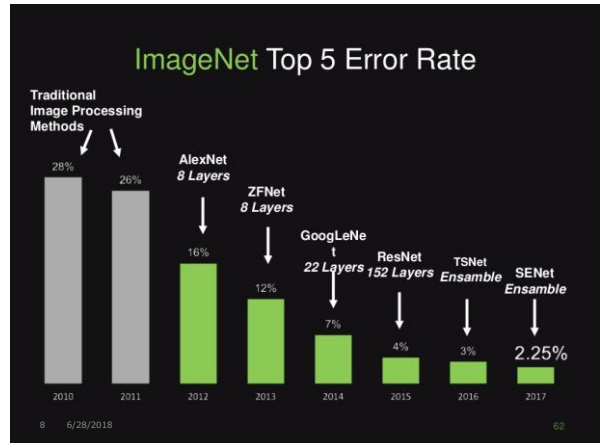


ILSVRC

- ImageNet Large Scale Visual Recognition Challenge
- An image classification challenge with 1,000 categories (1.2 million images)



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Autonomous Vehicles



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Autonomous Vehicles



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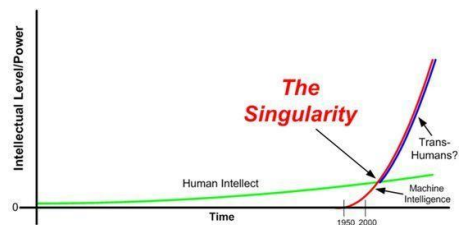
Autonomous Vehicles



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Narrow and General AI

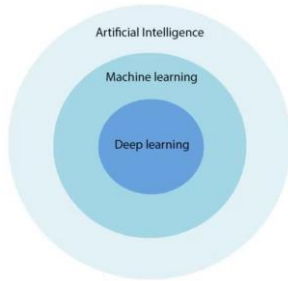


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Machine and Deep Learning

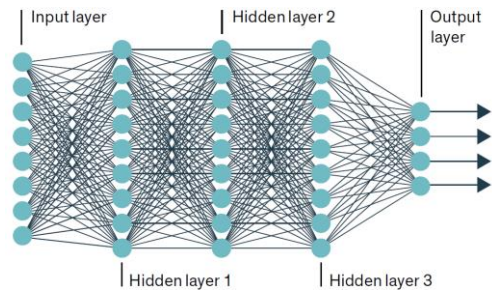
- ▶ **AI:** a branch of computer science dealing with the simulation of intelligent behavior in computers.
- ▶ **ML:** focuses on the development of computer programs that can access data and use it to learn for themselves.



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Deep Neural Networks



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Machine Learning Applications

- ▶ Classification



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Machine Learning Applications

- ▶ Classification
- ▶ Recognition



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Machine Learning Applications

- ▶ Classification
- ▶ Recognition
- ▶ Authentication

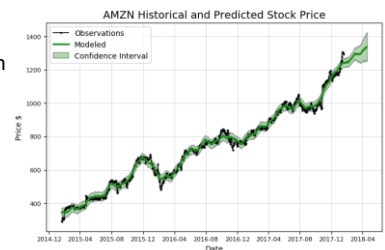


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Machine Learning Applications

- ▶ Classification
- ▶ Recognition
- ▶ Authentication
- ▶ Regression

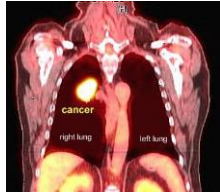


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Machine Learning Applications

- › Classification
- › Recognition
- › Authentication
- › Regression
- › Clustering



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Machine Learning Applications

- › Classification
- › Recognition
- › Authentication
- › Regression
- › Clustering
- › Anomaly detection



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Machine Learning Applications

- › Classification
- › Recognition
- › Authentication
- › Regression
- › Clustering
- › Anomaly detection
- › Recommendation
- › Transcription



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Recommendation Systems

- › A **Recommender System** predicts the likelihood that a user would prefer an item and it recommends items to the user.
- › **Examples:**
 - Facebook—“People You May Know”
 - Netflix—“Other Movies You May Enjoy”
 - LinkedIn—“Jobs You May Be Interested In”
 - Amazon—“Customer who bought this item also bought ...”
 - Google—“Visually Similar Images”
 - YouTube—“Recommended Videos”



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Sequence Transcription

- › Translating a sequence of one type to the corresponding sequence of another type.
- › **Examples:**
 - Translating English to Arabic
 - Speech recognition
 - Optical character recognition
 - Automatic diacritization of Arabic text
 - Handwritten recognition and synthesis



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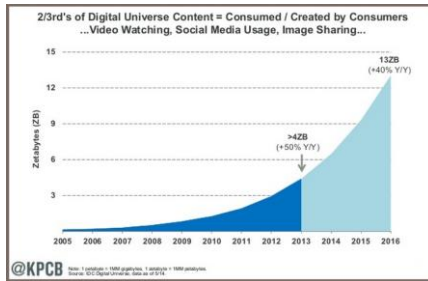
Why AI Is Succeeding Now?

1. Data availability
2. Better algorithms
3. Processor advancements



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1. Data Availability



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2. Better Algorithms

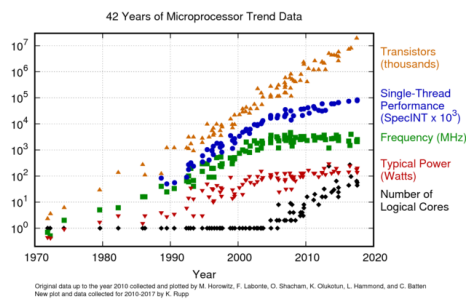
- › Machine Learning
- › Neural Networks
- › Convolutional Neural Networks (CNN)
- › Recurrent Neural Networks (RNN)
- › Reinforcement Learning



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3. Processor Advancements



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Nvidia Titan V

- › Graphics Processing Unit (GPU) for deep learning
- › Contains 21 billion transistors
- › Price = \$3,000
- › Performance: 110 Tera FLOPS



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Contains 84 SMs, each has 64 FP32, 64 INT32, 32 FP64, and 8 tensor cores



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Summary

- › AI is progressing very fast.
- › Machine learning and deep learning are responsible of most of this progress.
- › When will the AGI leads to the singularity?
- › AI is succeeding now due to
 - Availability of training data
 - Better algorithms
 - Higher computer performance

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Thank you

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