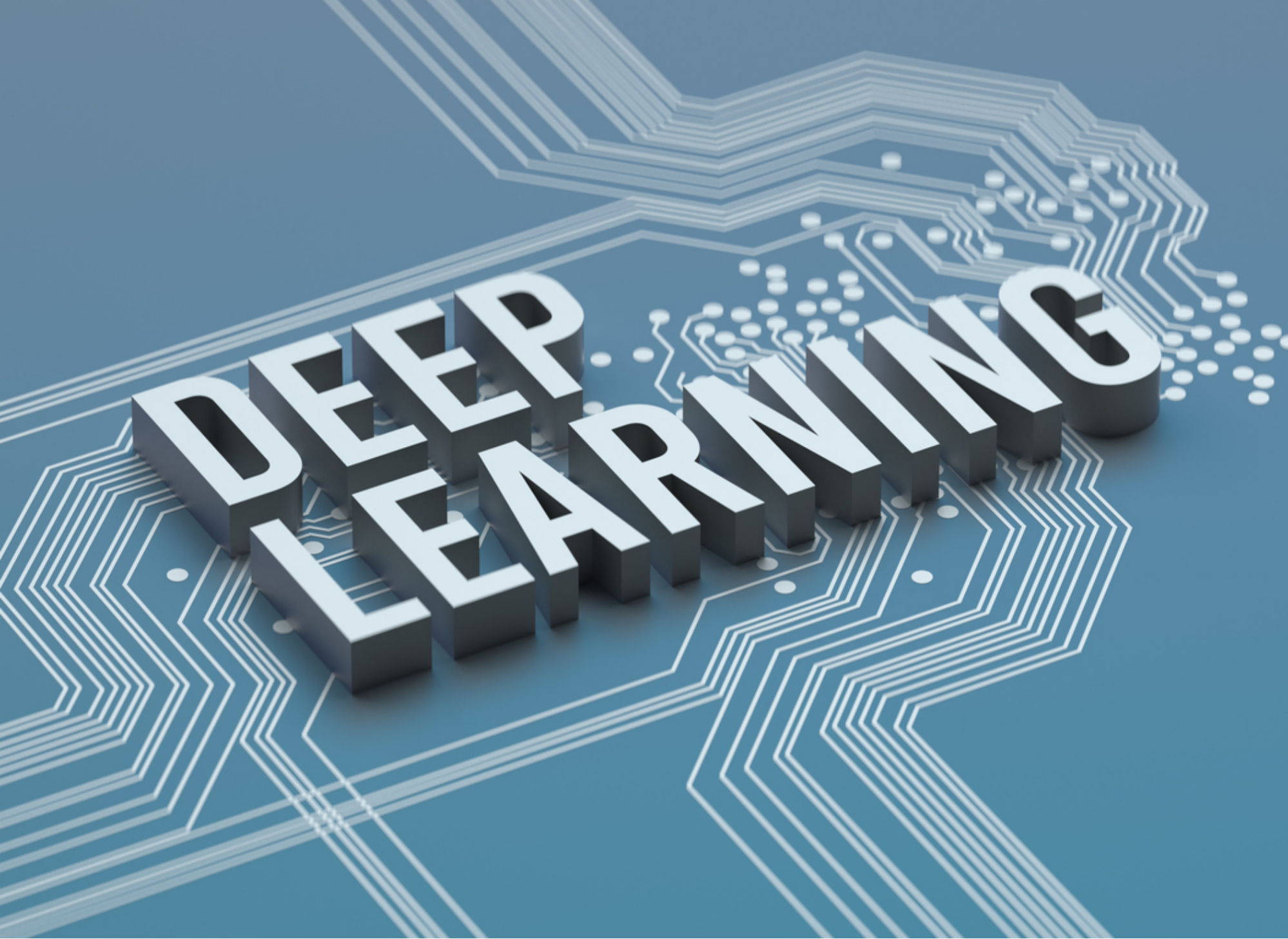

DEEP
LEARNING

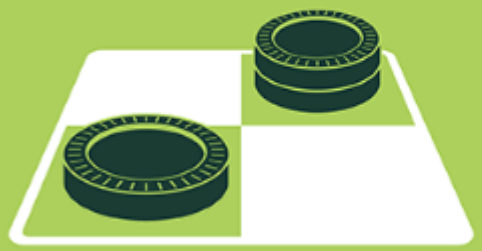
# WHAT IS DEEP LEARNING ?

```python
import tensorflow as tf

mnist = tf.keras.datasets.mnist

(x_train, y_train), (x_test, y_test) = mnist.load_data()
x_train, x_test = x_train / 255.0, x_test / 255.0

model = tf.keras.models.Sequential([
  tf.keras.layers.Flatten(input_shape=(28, 28)),
  tf.keras.layers.Dense(128, activation='relu'),
  tf.keras.layers.Dropout(0.2),
  tf.keras.layers.Dense(10, activation='softmax')
])

model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])

model.fit(x_train, y_train, epochs=5)

model.evaluate(x_test,  y_test, verbose=2)
```

Deep Learning is a subfield of Machine Learning in which deep, multilayered Neural Networks are used to make predictions, especially excelling in computer vision, speech recognition, natural language understanding, and so on.

# ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.

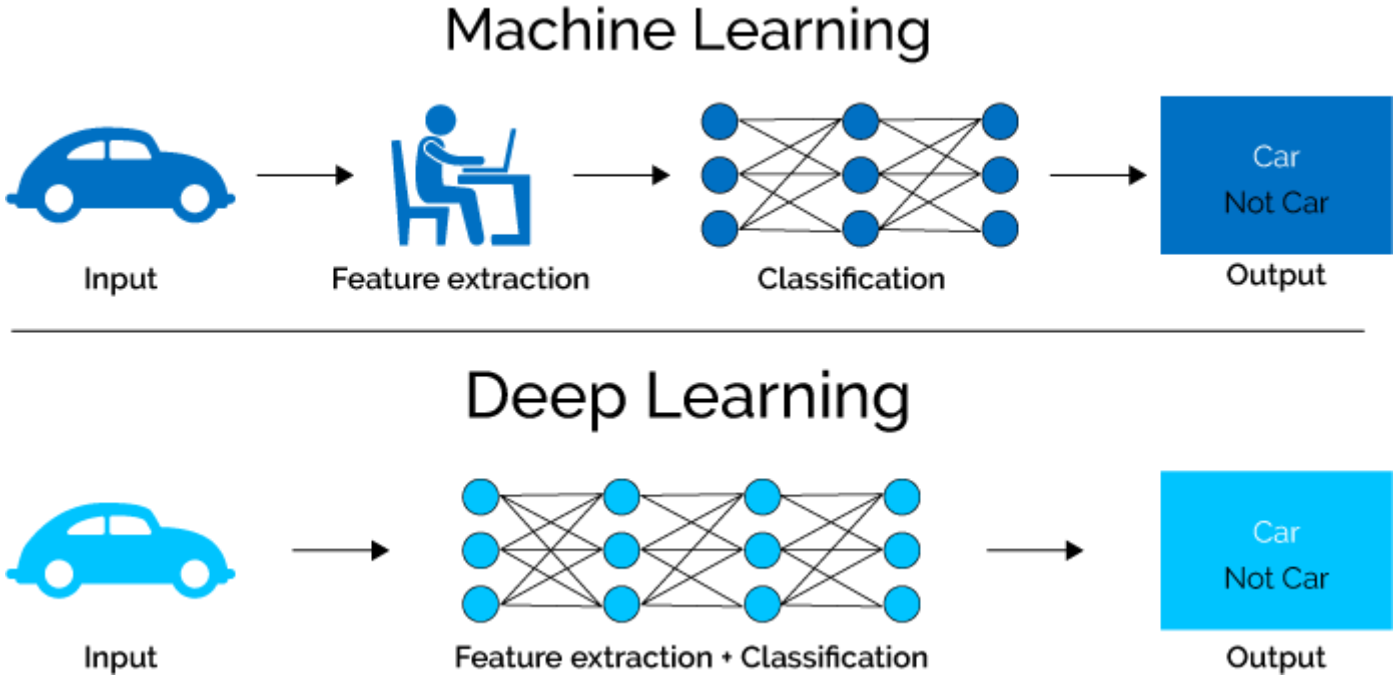


# MACHINE LEARNING

Machine learning begins to flourish.

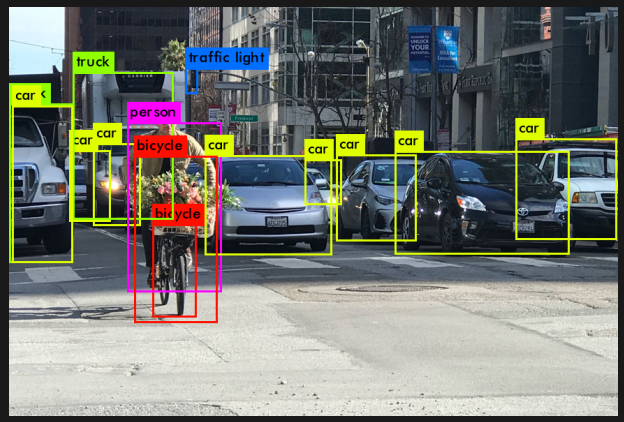
# DEEP LEARNING

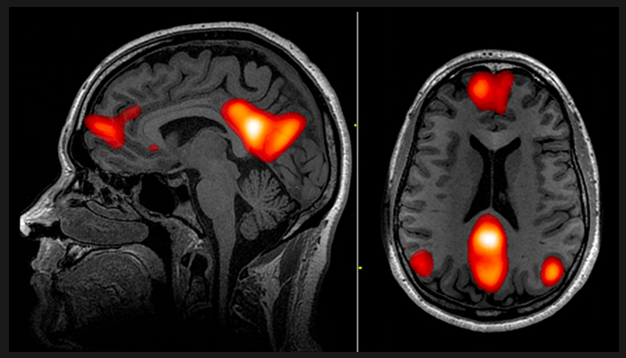
Deep learning breakthroughs drive AI boom.


Machine Learning
Input
Feature extraction
Classification
Car
Not Car
Output
Deep Learning
Input
Feature extraction + Classification
Car
Not Car
Output

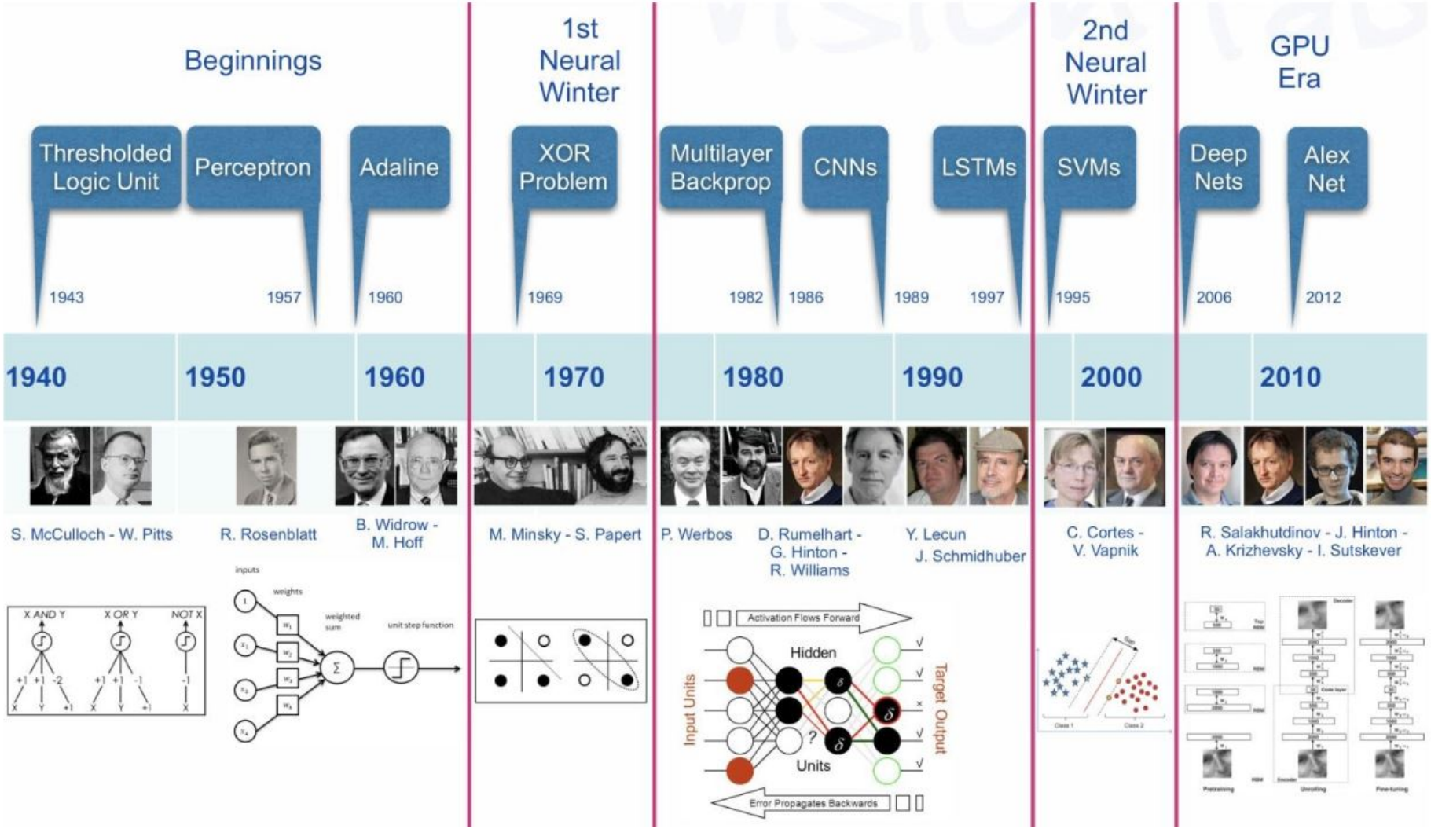
# APPLICATIONS

## Papers With Code



# DEEP LEARNING EVOLUTION



# WHY NOW ?

Data

Compute


Frameworks

Keras

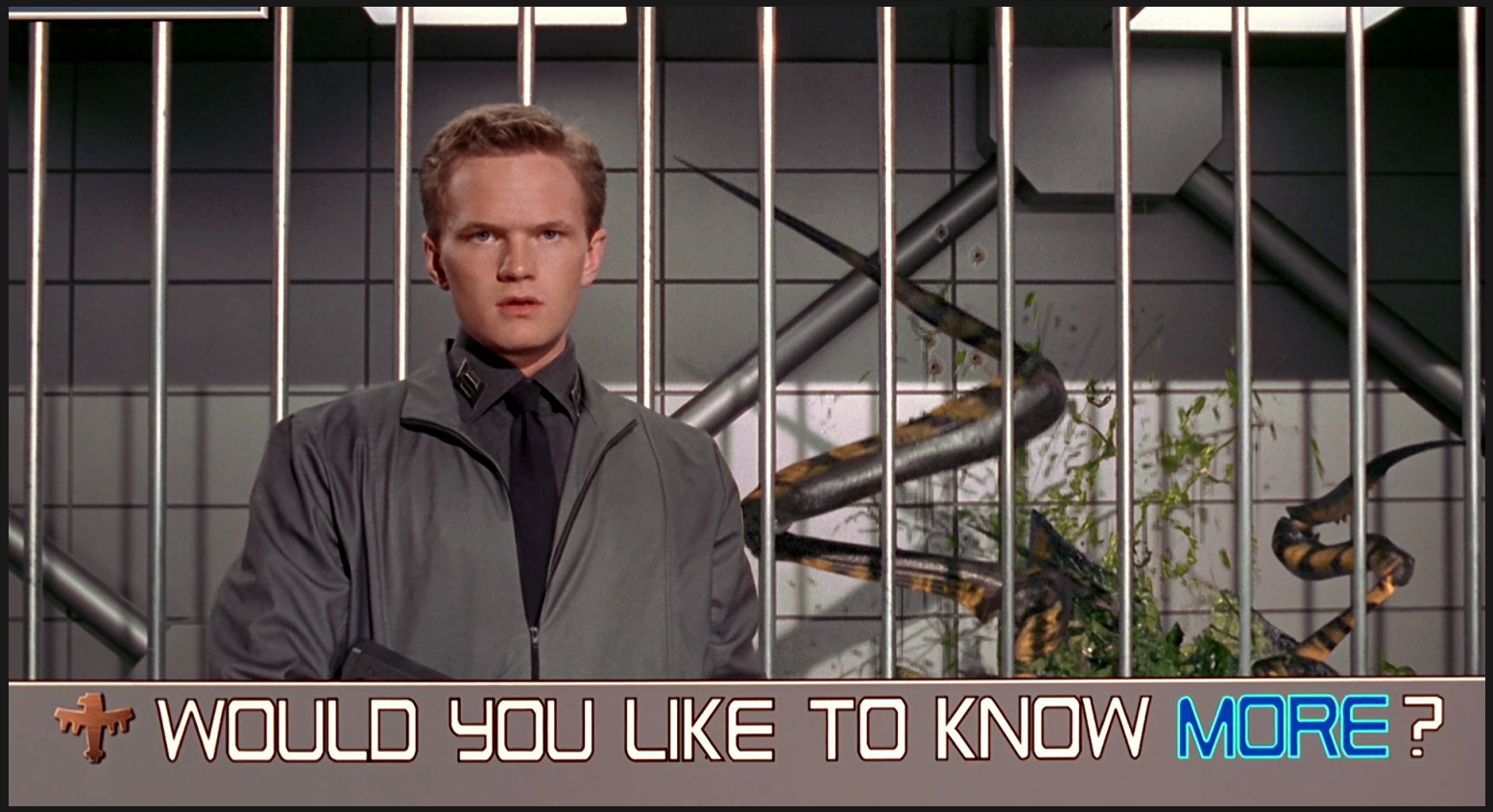
Caffe

TensorFlow

PyTorch

# ETHICS

- Bias
- Accountability (explainability)
- Reproducibility (hacking)
- Robustness (adversarial attacks)
- Privacy


WOULD YOU LIKE TO KNOW MORE?

# RESOURCES

- MIT Deep Learning SoA (2020)
- MIT Introduction to Deep Learning (2020)
- Goodfellow, I., Bengio, Y., Courville, A. (2016). Deep Learning
- Deep Learning with Python, by François Chollet