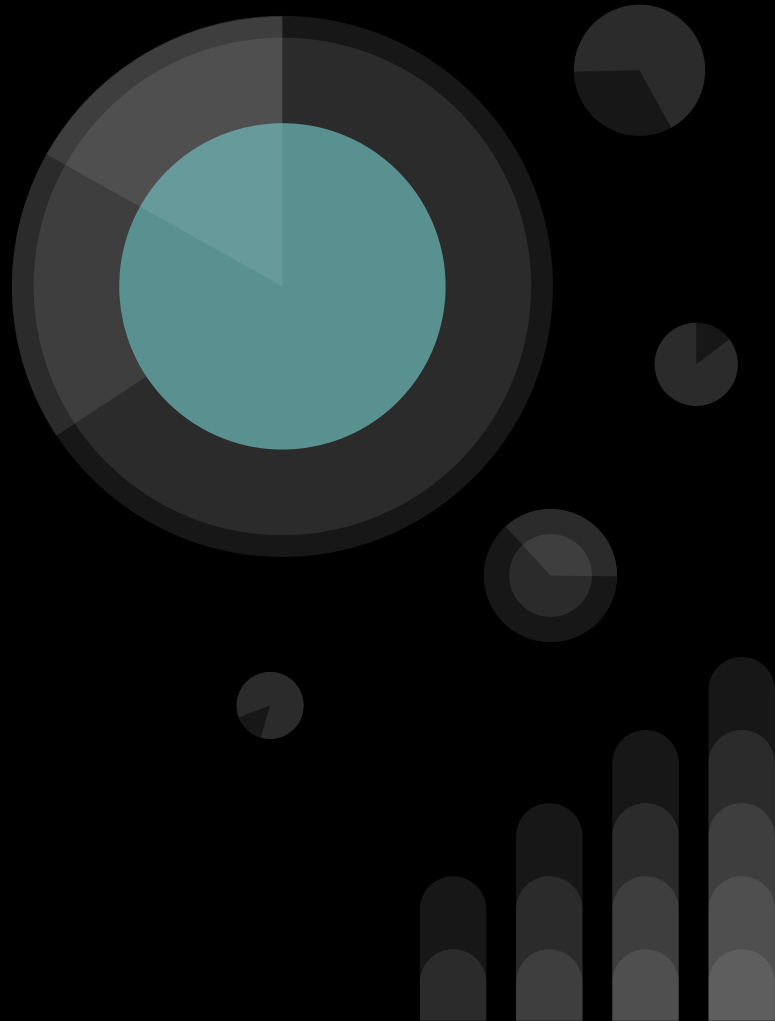
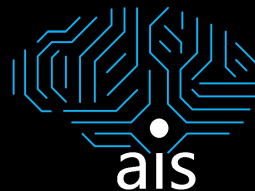


# Intro to Deep Learning with Keras

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## **How this workshop is going to work...**

- First - a very brief intro to machine learning and deep learning concepts.
- Second - a deep dive into deep learning theory and how to use Keras for deep learning.



## **Resources for this Workshop - on GitHub**

<https://github.com/AmolMavuduru/IntroToDeepLearning>

Includes slides, code, and images used for examples.



## Software Dependencies

You will need the following libraries to run the code:

- Anaconda distribution of Python
- Keras and TensorFlow.



+





# About Keras and TensorFlow

## TensorFlow

- Developed and released by the Google Brain Team in 2015.
- Arguably the most popular deep learning library.
- Dataflow programming paradigm (tough for beginners).



## Keras

- Built by François Chollet, a Google AI researcher.
- Released in 2015.
- Object-oriented programming paradigm (easy for beginners).
- Can run on top of TensorFlow.





# What is machine learning?

- Machine learning is an area of **artificial intelligence** that is focused on using **mathematical** and **statistical** techniques to “**give machines the ability to learn**” without being explicitly programmed.
- Usually involves **some form of data** with **examples** to learn from.



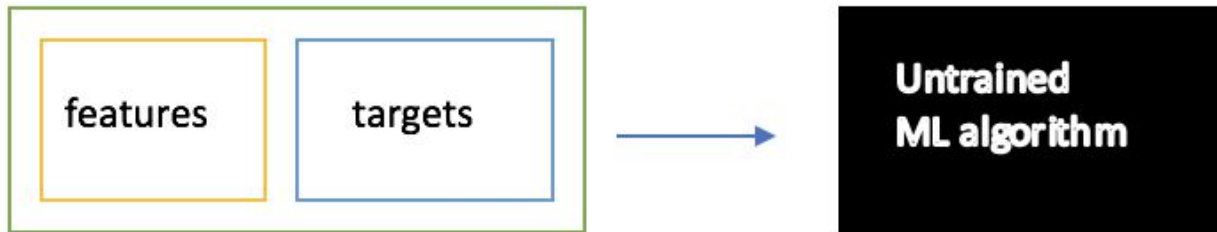
## How Supervised ML Works

1. Start with training data
2. Train an algorithm on the training data.
3. Test the algorithm's performance on test data.
4. Repeat steps 2-3 with improved algorithms.

# Supervised ML - Training Phase

- Training data has examples with **features** (inputs) and **targets** (outputs/what you want to predict).
- Example:
  - features - temperature during last 10 days
  - target - temperature for the next day

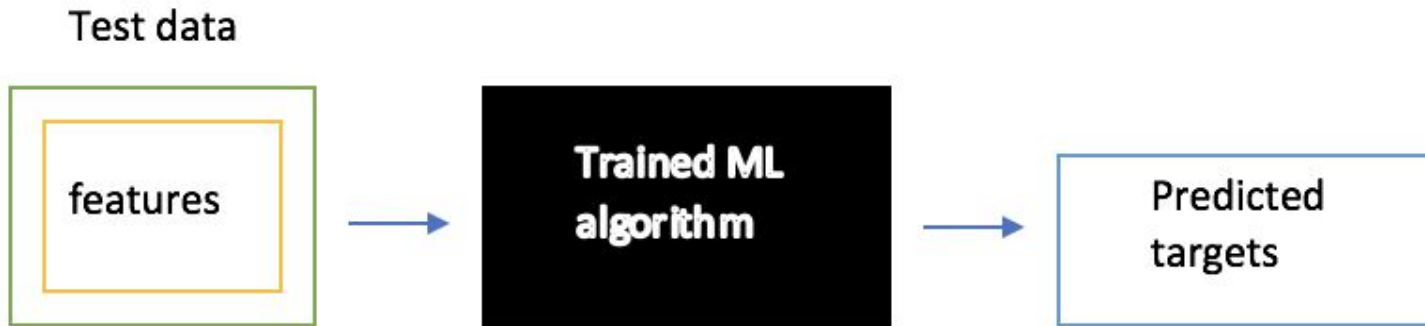
Training data





# Supervised ML - Testing Phase

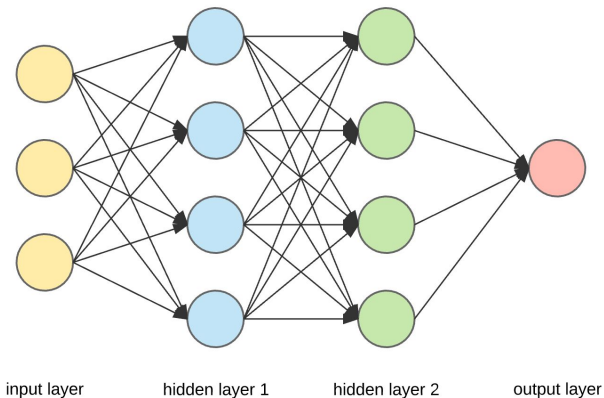
- Test data also has features and targets.
- Except this time, we are trying to predict the targets using the features and evaluate our predicts.





# What is Deep Learning?

- A form of machine learning inspired by human learning.
- Uses algorithms called neural networks.
- Based on a lot of math!





# MNIST - Recognizing Handwritten Digits

- In this workshop we will see how to train a neural network to recognize handwritten digits!
- We will see a neural network reach human-level performance in just a few minutes of training!