

AI Boot Camp

The Impact of Machine Learning

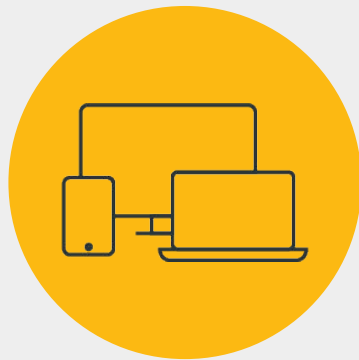
Module 1 Day 2



Class Objectives

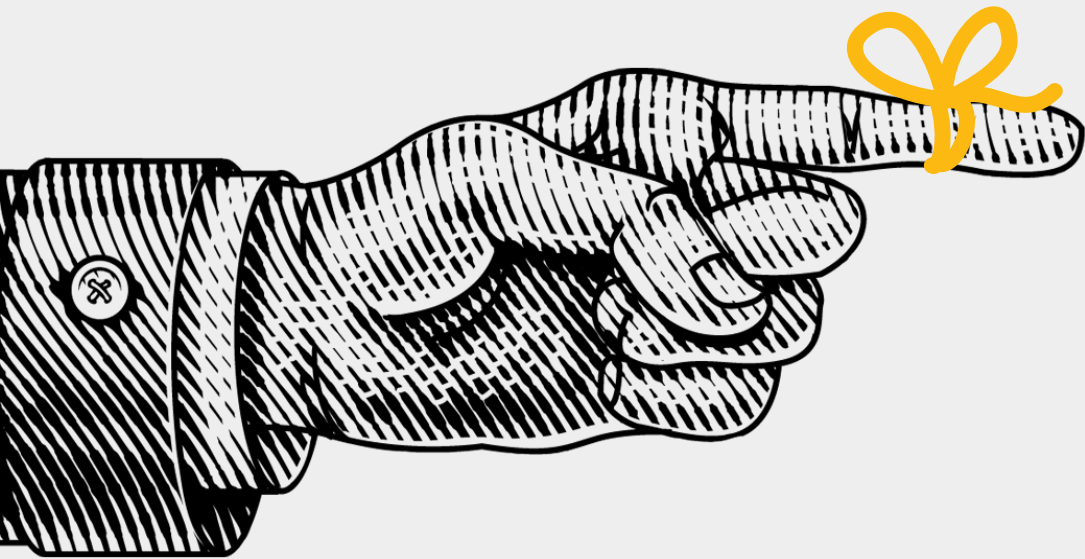
By the end of class, you will be able to:

- 1 Compare and contrast supervised and unsupervised ML.
- 2 Define complex AI models including neural networks, deep learning, natural language processing, and transformers.
- 3 Download and upload files to GitHub using the git GUI.
- 4 Add, commit, and push code to GitHub from the command line.



Instructor **Demonstration**

Demystifying Machine Learning

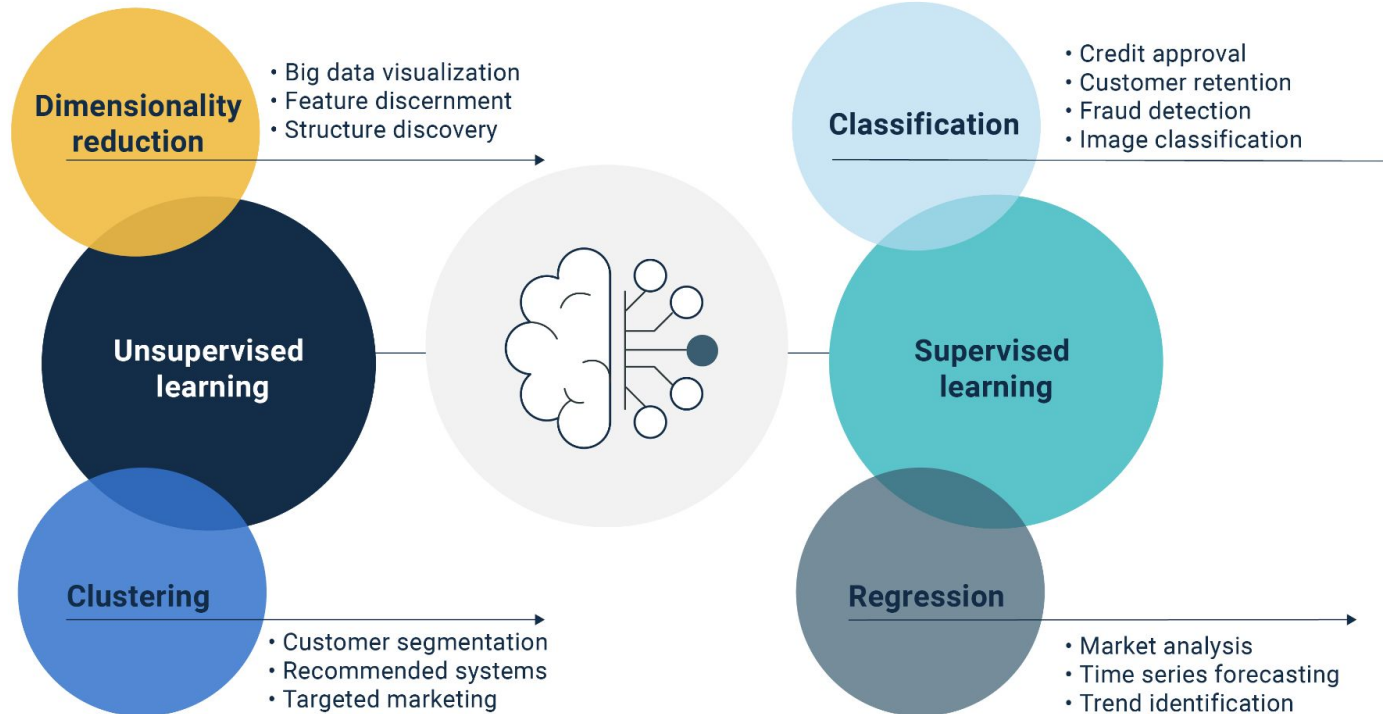


Remember,

Machine learning (ML) is the practice of applying computer algorithms and statistics to create models that can learn from data, and then make decisions or predictions about future data.

ML algorithms learn how to make decisions without needing anyone to program all that logic. They learn the patterns, behavior, and logic on their own directly from the data, and then use that knowledge to make decisions and predictions.

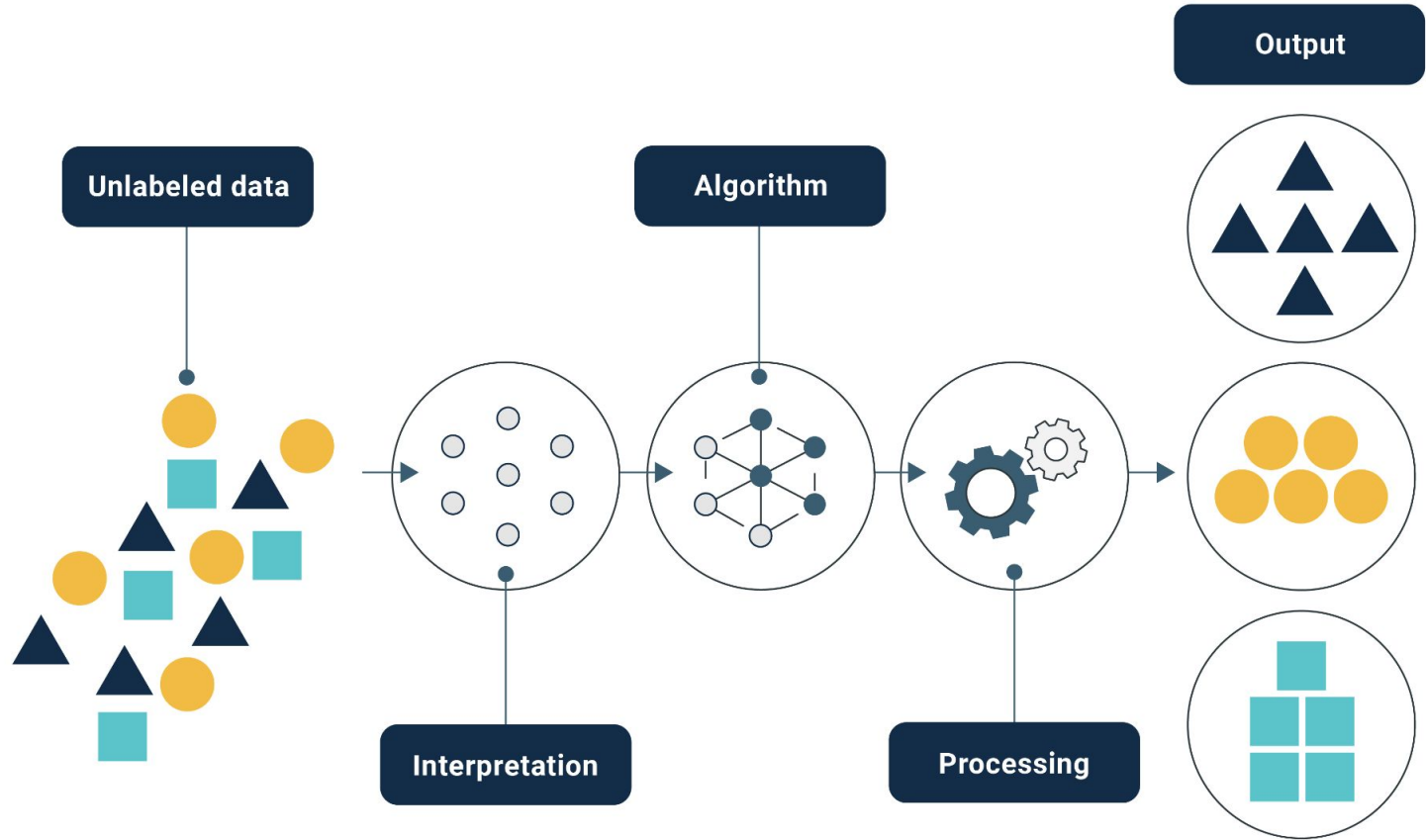
Types of Machine Learning



Types of Machine Learning

| Supervised Learning | Unsupervised Learning |
|---|--|
| Trained with labeled data | Trained with unlabeled data |
| Finds relationships that help in predicting the labels in the training data | Finds relationships in the data that help distinguish data points more generally |
| Uses those relationships to predict which labels new points should have | Uses those relationships to add context that can assist in further analysis |

Unsupervised Learning



Applications of Unsupervised Learning

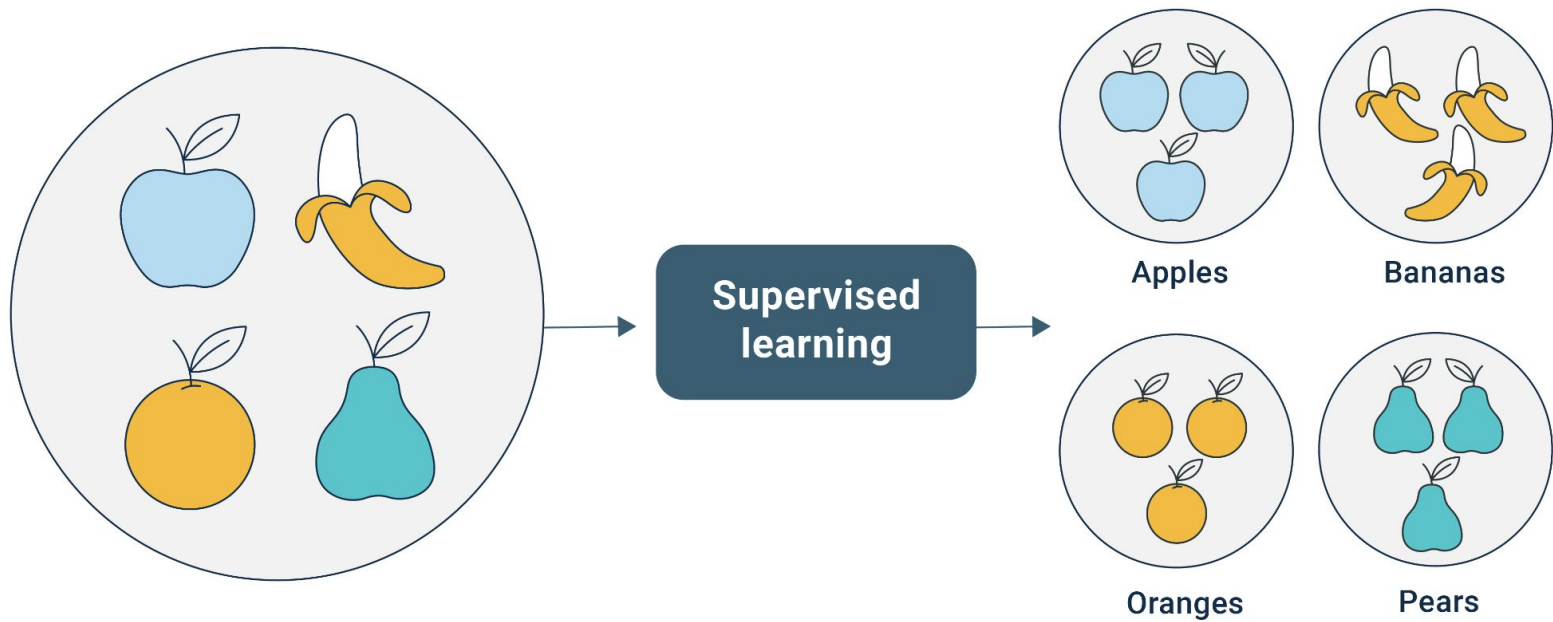
1 Exploratory data analysis

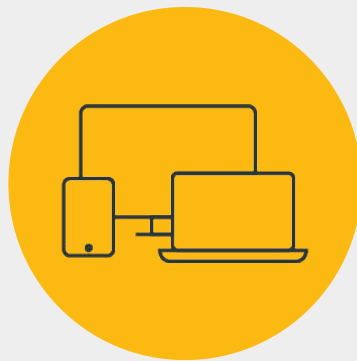
2 Cross-selling tactics

3 Consumer segmentation

4 Pattern recognition

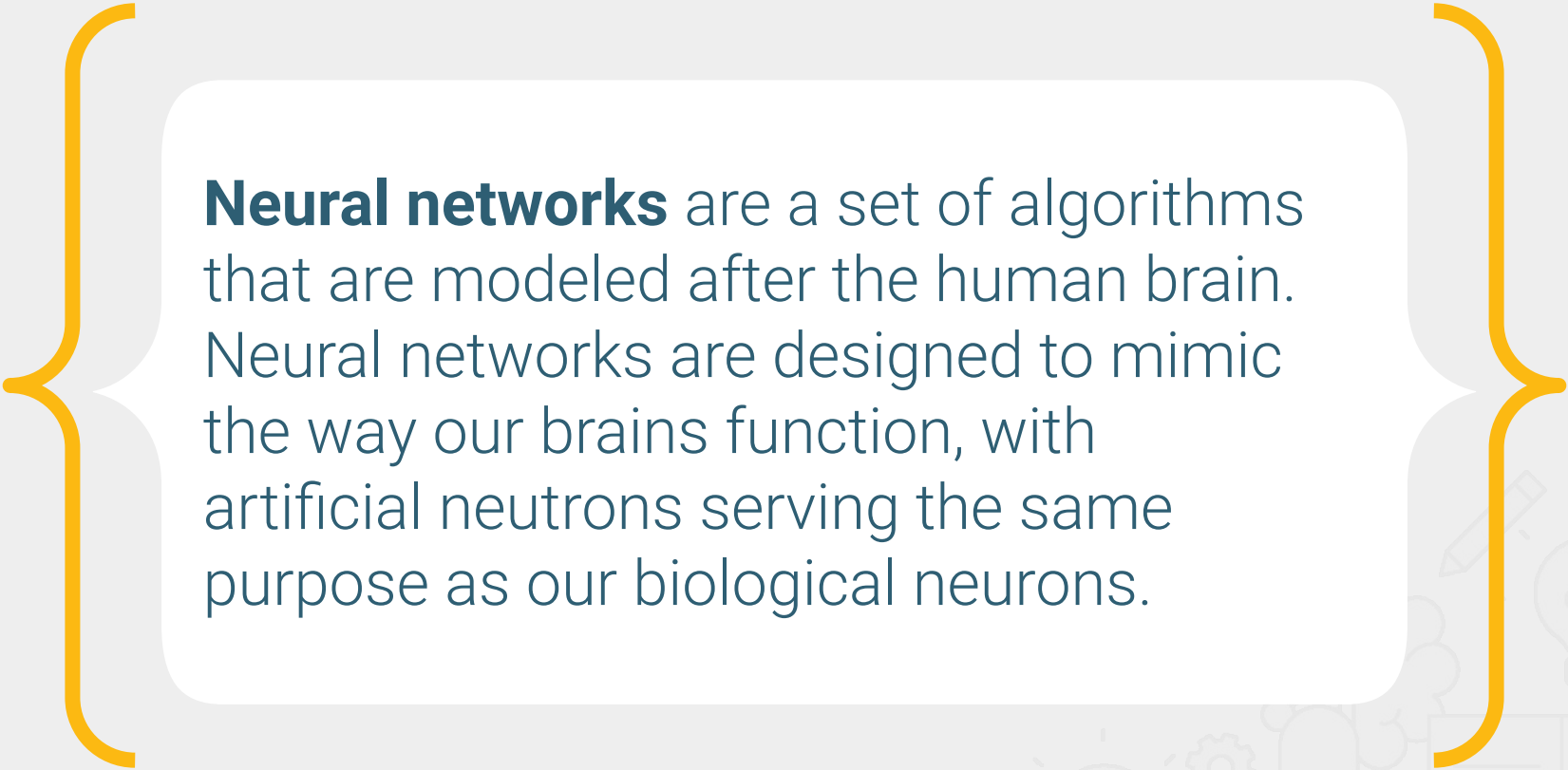
Supervised Learning



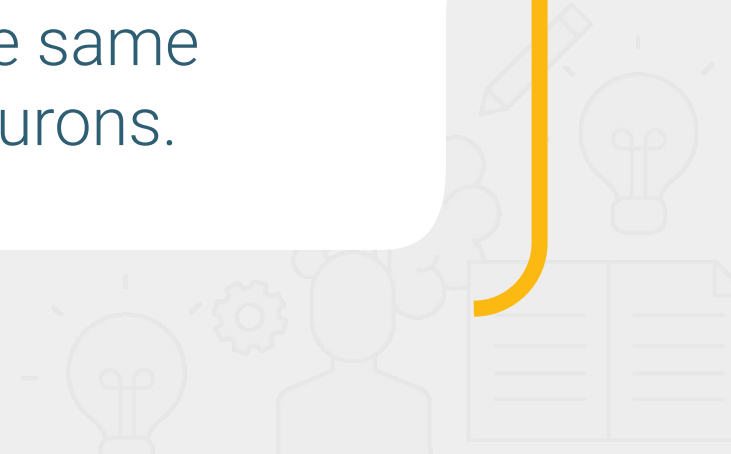


Instructor **Demonstration**

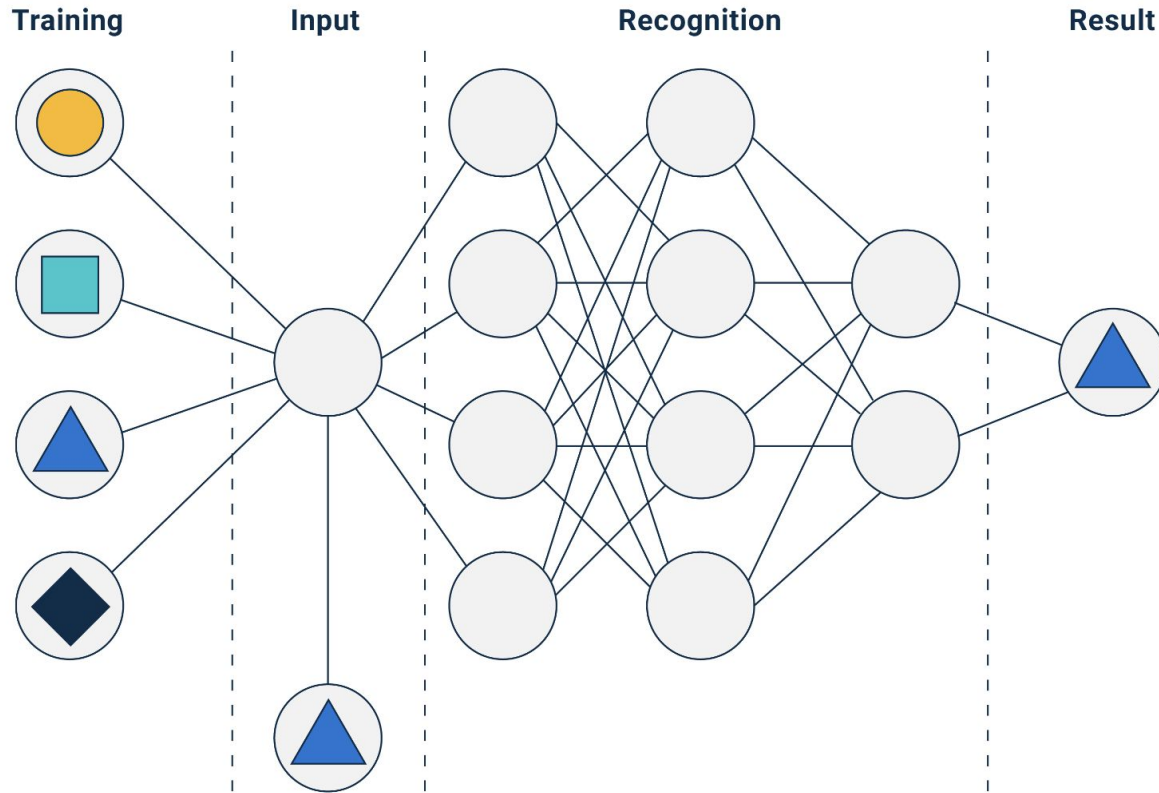
Advanced Technologies



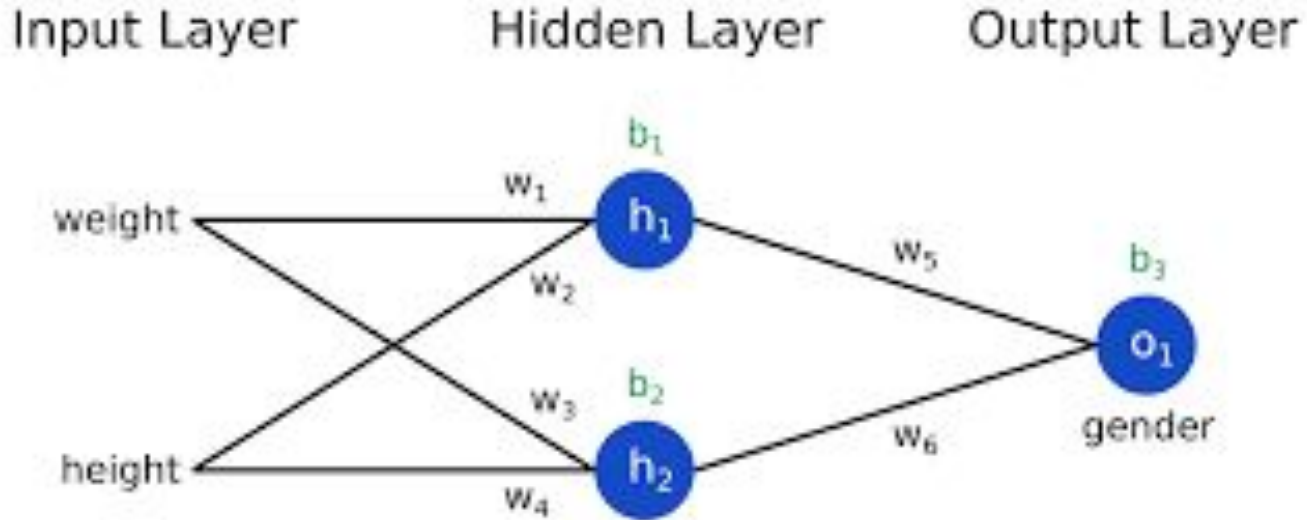
Neural networks are a set of algorithms that are modeled after the human brain. Neural networks are designed to mimic the way our brains function, with artificial neurons serving the same purpose as our biological neurons.



Neural Networks



Neural Networks



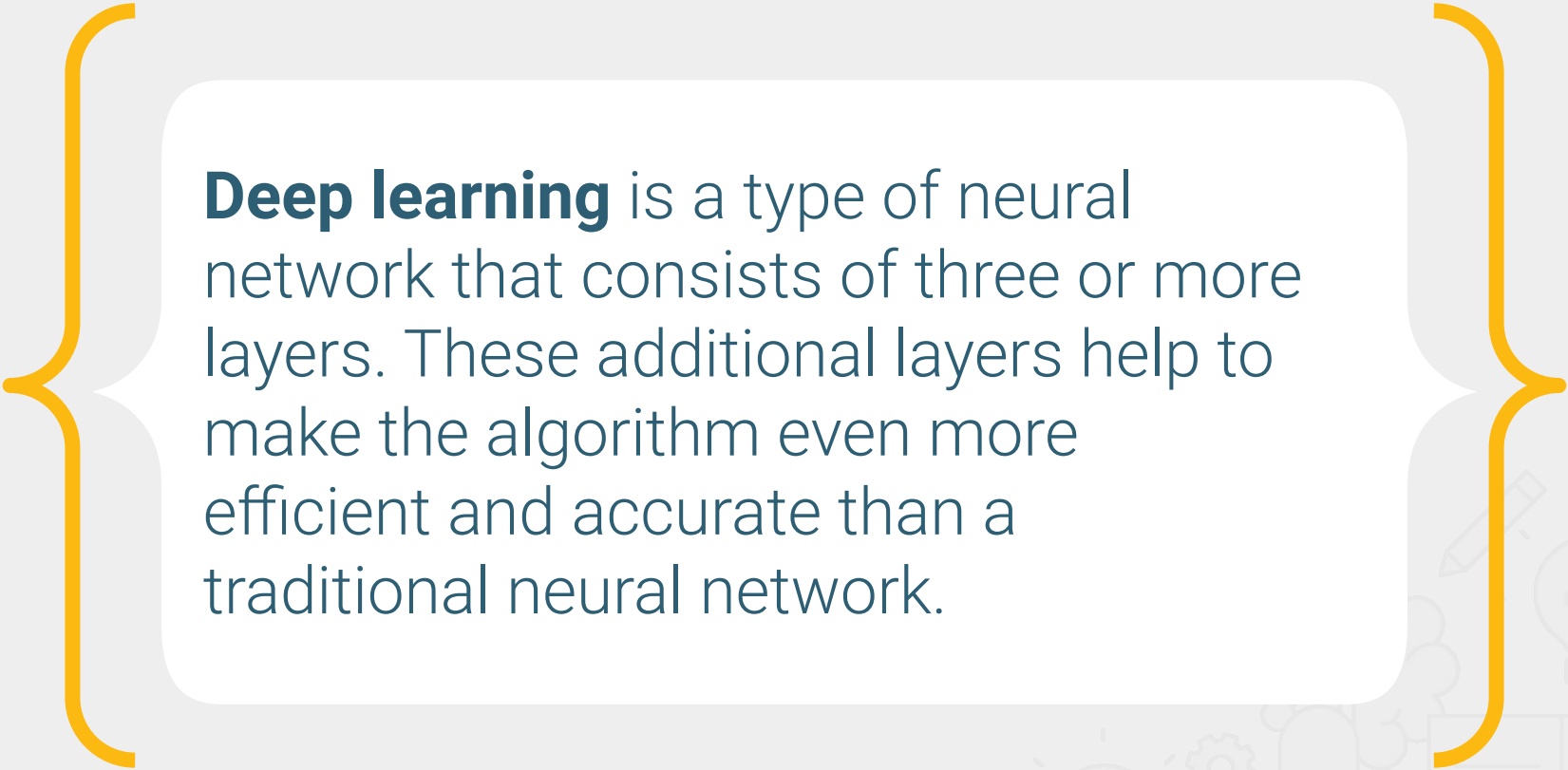
Neural Networks vs. Traditional Machine Learning Models

Advantages


- Effectively detect complex relationships within data
 1. Predict consumer behavior
 2. Likelihood of default
- Greater tolerance for “messy” data

Disadvantages

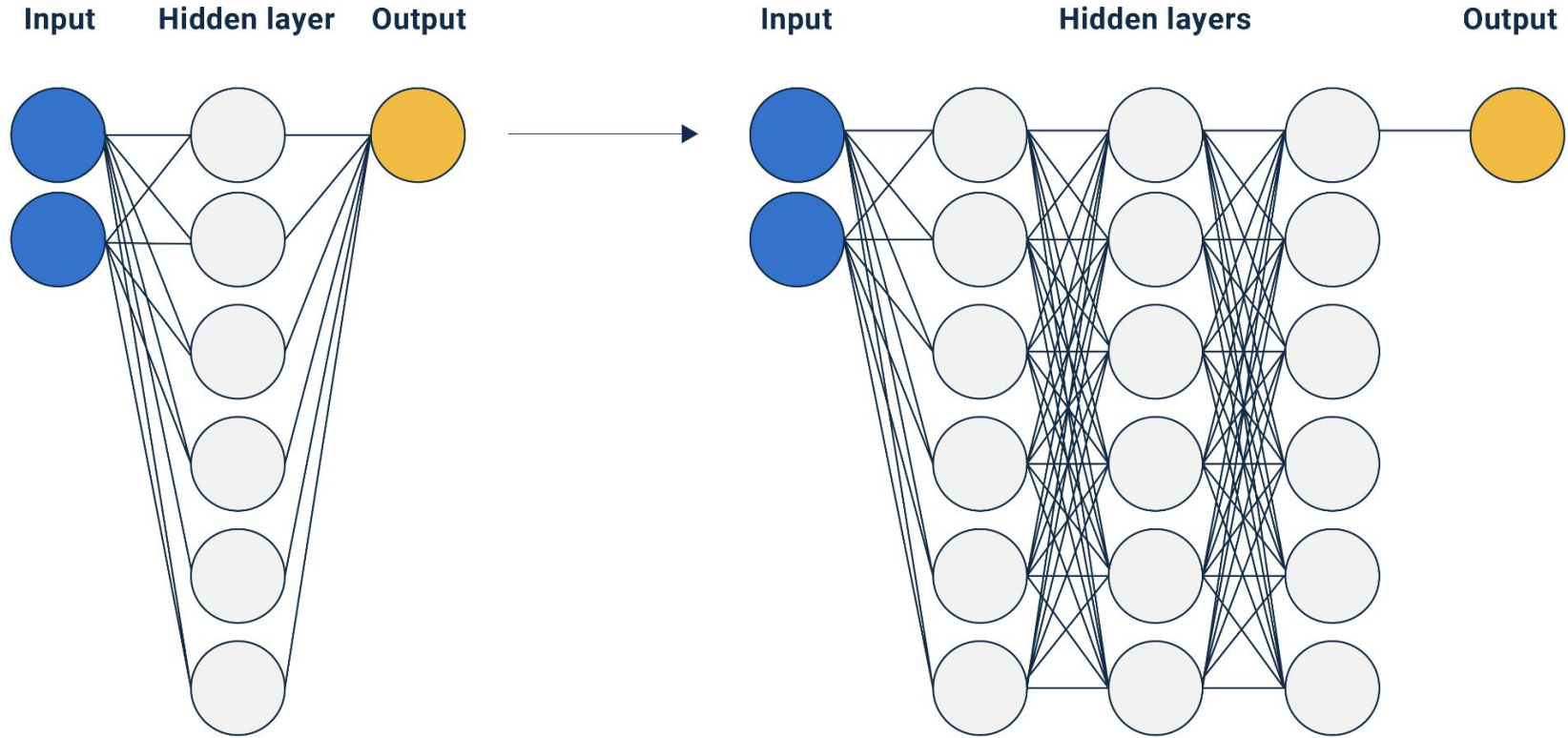
- Too complex for humans to understand
 1. The “black box” problem
- Prone to overfitting



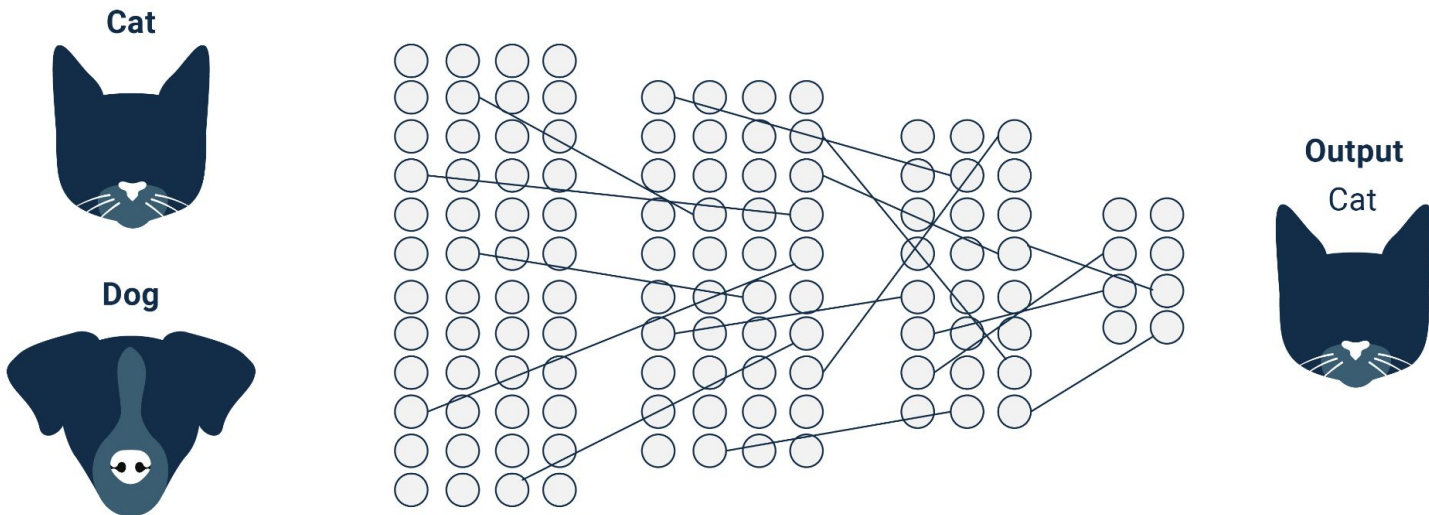
Deep learning is a type of neural network that consists of three or more layers. These additional layers help to make the algorithm even more efficient and accurate than a traditional neural network.

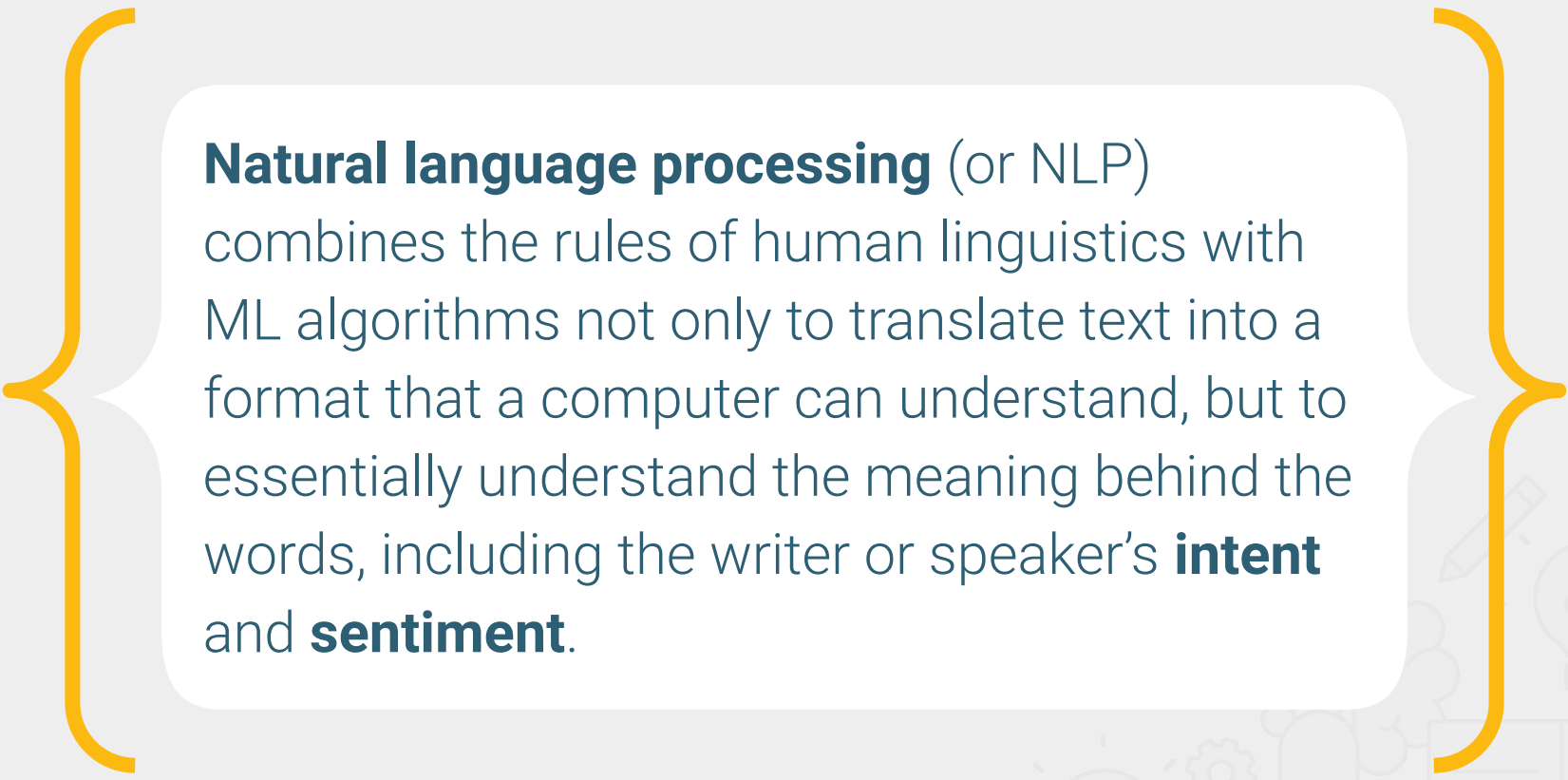


Deep Learning

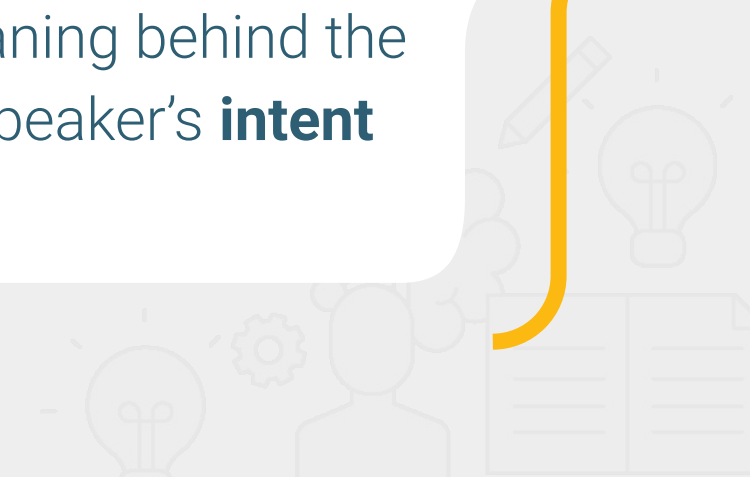


Example: Neural Network





Natural language processing (or NLP) combines the rules of human linguistics with ML algorithms not only to translate text into a format that a computer can understand, but to essentially understand the meaning behind the words, including the writer or speaker's **intent** and **sentiment**.





A **large language model** is a type of “deep learning algorithm that can recognize, summarize, translate, predict and generate text and other forms of content based on knowledge gained from massive datasets.”

— **Lee, A.** 2023. *What are large language models used for?* [Blog, 26 January].

Available: <https://blogs.nvidia.com/blog/2023/01/26/what-are-large-language-models-used-for/> [2023, April 6].



“A **transformer model** is a neural network that learns context and thus meaning by tracking relationships in sequential data like the words in this sentence.”

— **Merritt, R.** 2022. *What is a transformer model?* [Blog, 25 March].

Available: <https://blogs.nvidia.com/blog/2022/03/25/what-is-a-transformer-model/> [2023, April 5].

Transformer Model Process

- 1 Text or spoken words are fed into the algorithm which extracts the data and breaks each element into individual words or phrases through a process called **tokenization**.
- 2 The algorithm classifies and labels each element.
- 3 Using statistical training, the algorithm proposes the *most likely* meaning of the data.

Applications of NLP Models

1

Distinguishing spam from legitimate emails

2

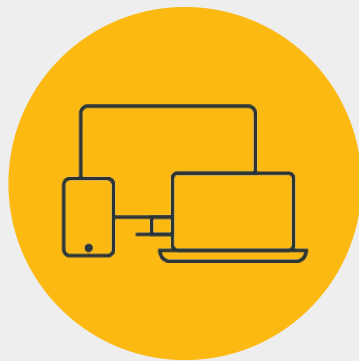
Translating from one language to another

3

Social media sentiment analysis

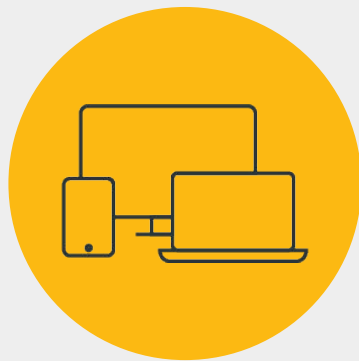
4

Chatbots and virtual agents



Instructor **Demonstration**

Machine Learning is Awesome



Instructor **Demonstration**

AI Foundations

AI Foundations

Today's AI Foundations section will cover GitHub, the industry-standard collaboration tool.

1

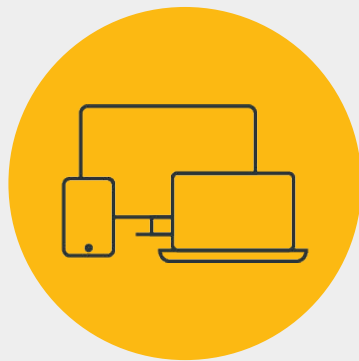
You will use GitHub to store your code, collaborate with your peers on projects, and submit assignments.

2

Your first Challenge assignment will be creating a repo with GitHub.

3

Getting comfortable with Git and GitHub is critical for your success in the boot camp and post-graduation. Invest the time now to get to know it well.

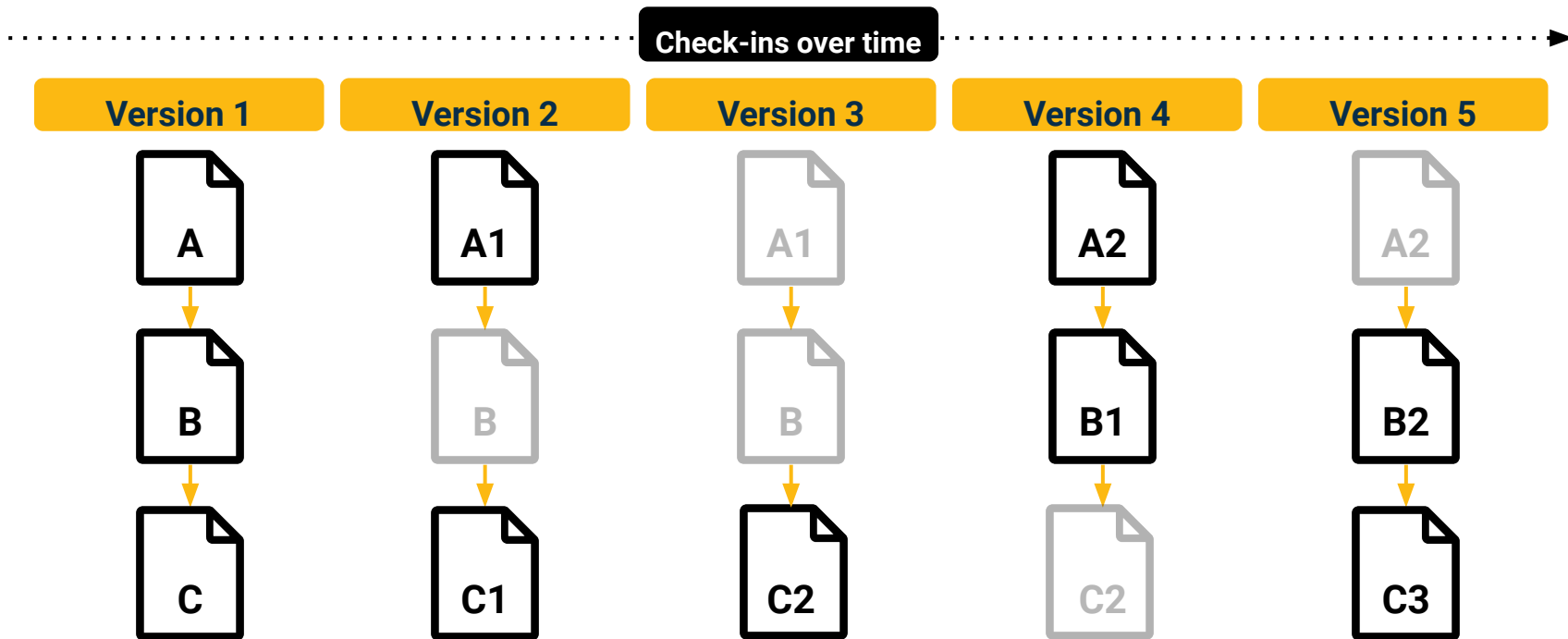


Instructor **Demonstration**

Intro to Git

Intro to Git

Git is a way for us to keep track of our work over time. Whenever we get another piece of a project working, we can save the change with Git.





Dear Git,

I made some changes
to these files:

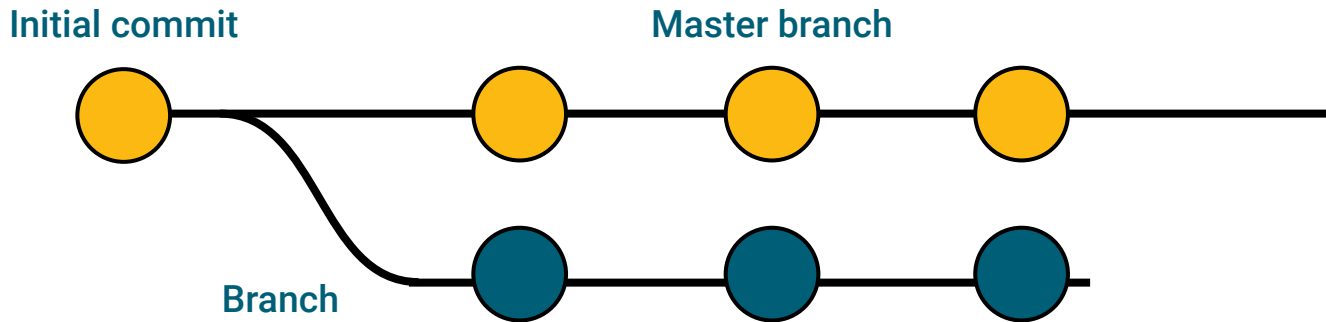
1. 
2. 

and here is why



Git Commit

A Git “save” is called a **commit**. It represents a checkpoint for our project where we save and describe our work.

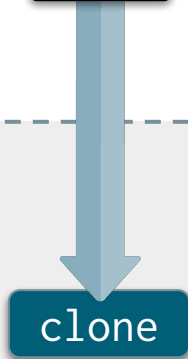
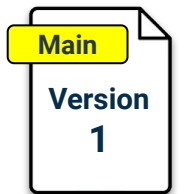
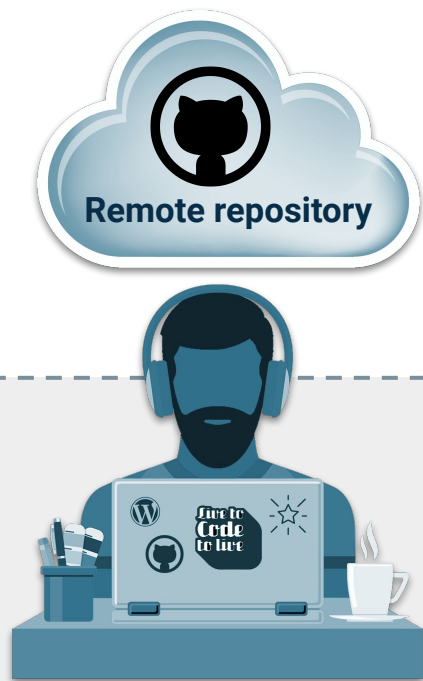


If we break something while working on our code, this system allows us to restore working code from earlier. Since Git remembers these checkpoints, we can work on several different concerns all at once.

Git Version Control

Scenario: Your group has been working with Uber's rider data, and you've decided to analyze the average age of the riders.

The root code for the project is called `main`.



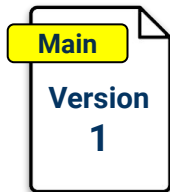
The **staging area** is where you edit the files that will be part of the next commit.

Staging area

This takes an existing GitHub repository, downloads it to the local computer, and links it to GitHub.

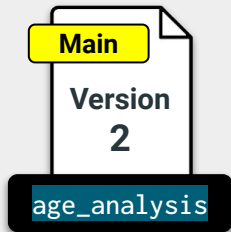
Git Version Control

Git essentially allows us to write this code and save it with the name `age_analysis`.



The **staging area** is the where you edit the files that will be part of the next commit.

Staging area



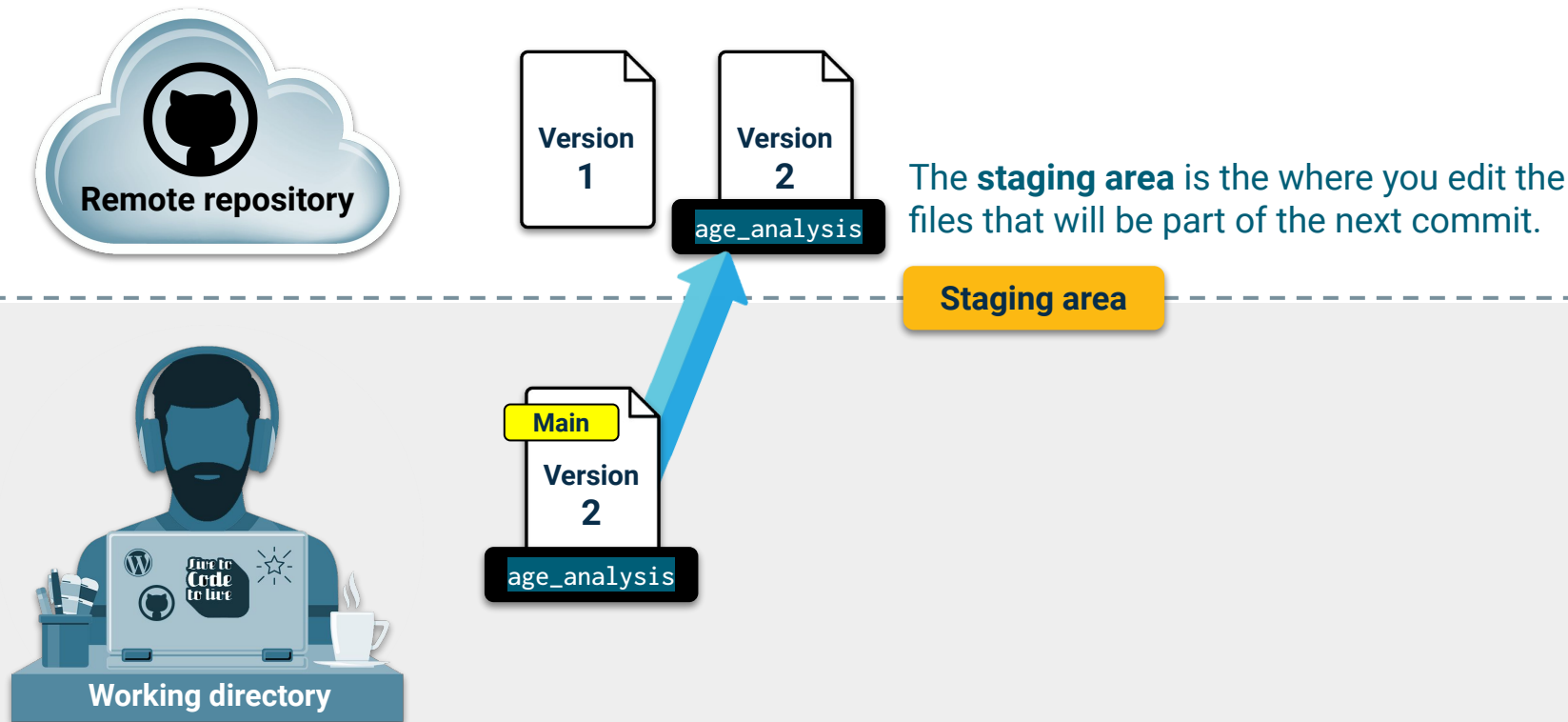
`git commit`



Your staged changes are saved once you commit.

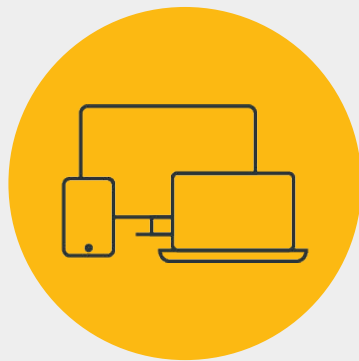
Git Version Control

`age_analysis` is a branch that originates from the main branch. It contains updates that will be added to the main branch when it's ready to `merge`.



Popular Git Commands

| | |
|-------------------|--|
| git clone | Clones a Git repository onto the local file system |
| git add | Adds changed files to the queue of tracked files ready to be committed |
| git commit | Adds tracked files as a bulk checkpoint ready to be pushed to the remote Git repository |
| git push | Uploads changed files from the local Git repository to the remote Git repository and updates the remote files |
| git pull | Downloads changed files from the remote Git repository to the local Git repository and updates the local files |



Instructor **Demonstration**

Branching

Git Branching

- 1 Every Git repo starts off with a main branch, which is there to hold the production version of the repo's code. But when we want to work on the code, we start by creating a new feature branch off the main.
- 2 If we create a new branch from the main, we essentially create a self-contained copy of all of the main branch code for us to work in.
- 3 When we're satisfied with our work in the new feature branch, we submit a pull request from the feature branch to the main branch.
- 4 A pull request is a request to merge the diffs or changes from the source branch (the feature branch) to the target branch (main).

Git Branching

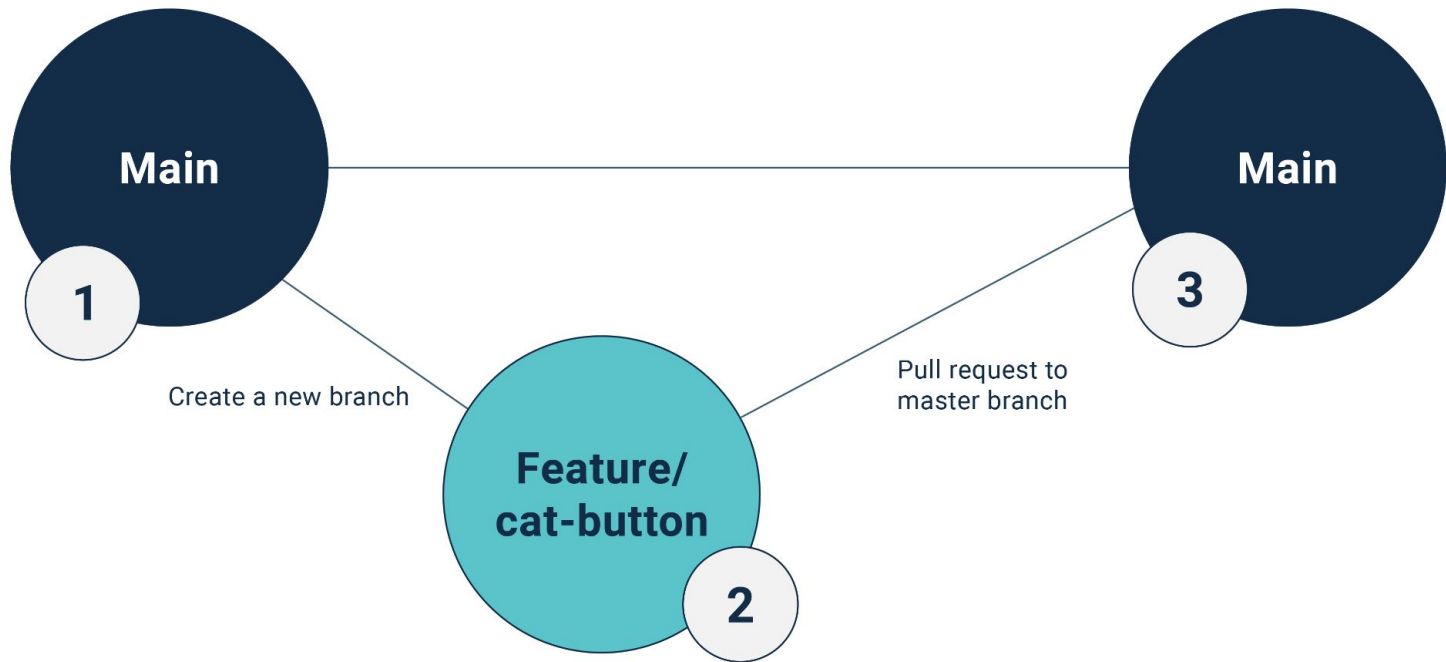
5

With the way our repos are set up now, another group member must look at and approve the pull request before its changes can be merged into the main.

6

Once a feature branch has been merged into the main, we delete it and then check back out to the main branch. From there, we'd check back out to a new feature branch, and repeat the process for each feature we add.

Git Branching





Activity:

Git Branching, Pushing

In this activity, you will create branches, submit pull requests, and perform code reviews before merging.

Suggested Time:

15 Minutes



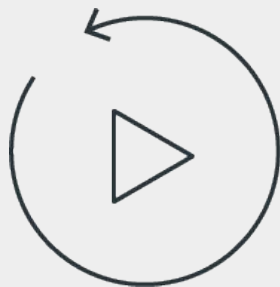


Time's up!
Let's review



Questions?





Let's **recap**



Recap

After today's lesson you are able to:

1

Compare and contrast supervised and unsupervised learning.

2

Define complex AI models including neural networks, deep learning, natural language processing, and transformers.

3

Download and upload files to GitHub using the git GUI.

4

Add, commit, and push code to GitHub from the command line.



Next

In the next lesson, you'll engage in a series of activities, from brainstorming about your personal interactions with AI to investigating its transformative effects across diverse sectors. You'll also get your hands on practical AI tools like Anaconda, the command line, and GitHub.



The End