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# Let's Talk Machine Learning

Douglas Starnes  
Memphis Python User Group  
July 2024

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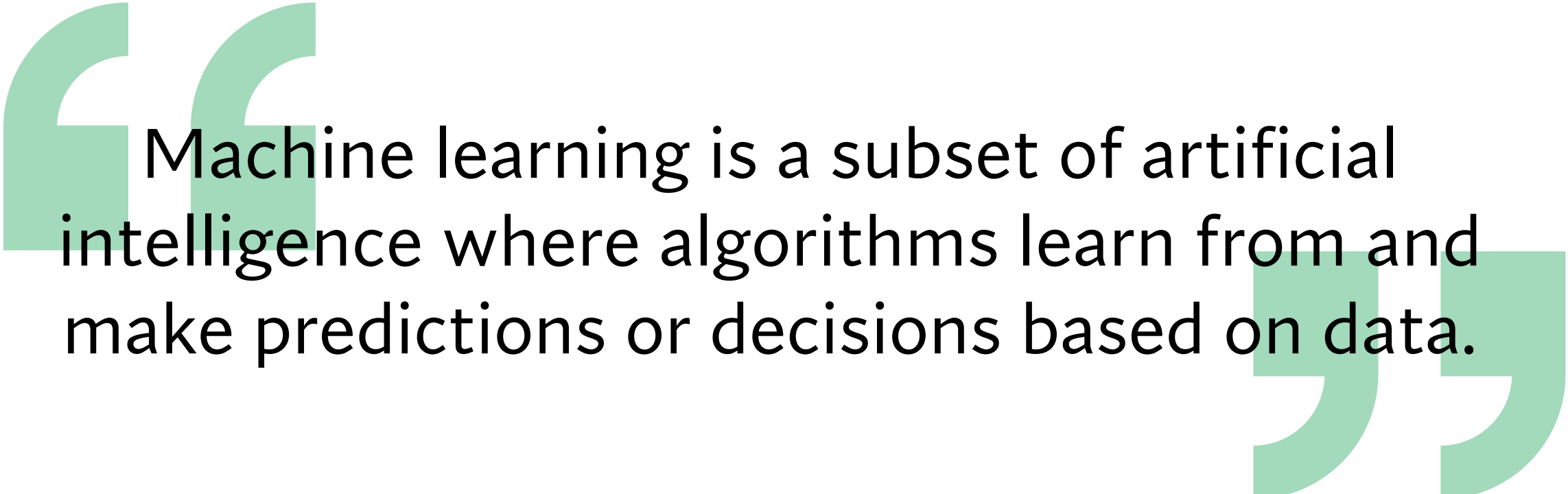
# Obligatory Narcissism Slide

- Hi, I'm Douglas!
- Memphis, TN area
- Professional Explainer
- Memphis Python UG & Memphis Azure UG
- Scenic City Summit & TDevConf
- 5x Microsoft Most Valuable Professional
  - Developer Technologies (Python)
  - AI Platform (Azure AI Services)

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# What is machine learning?

(according to ChatGPT)

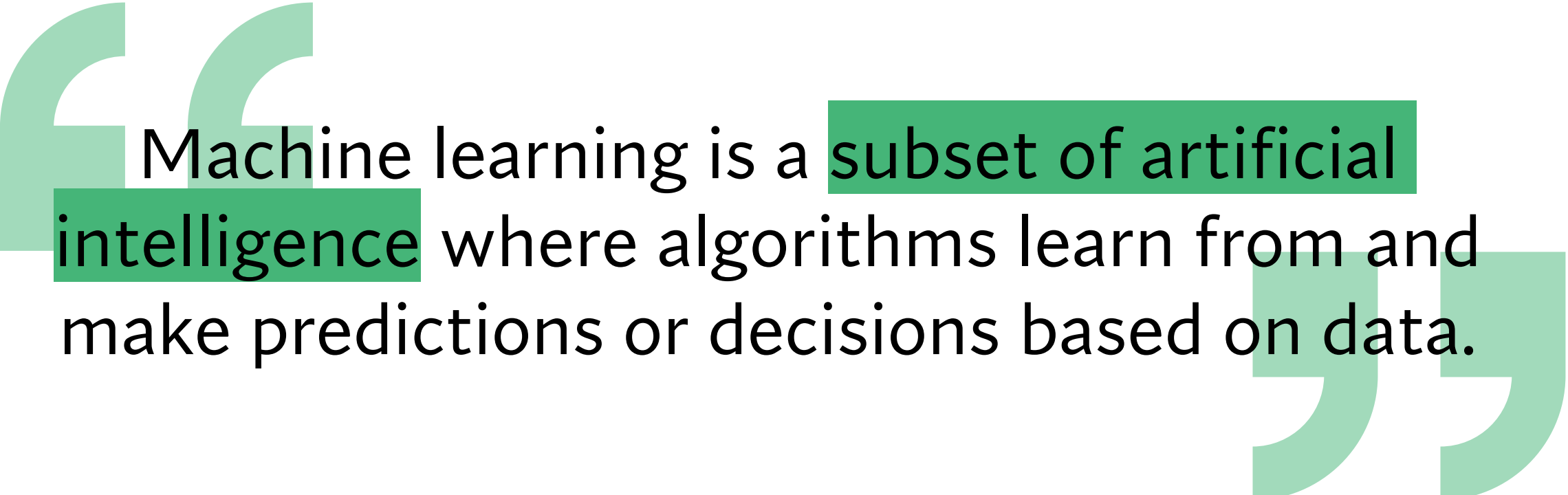


Machine learning is a subset of artificial intelligence where algorithms learn from and make predictions or decisions based on data.

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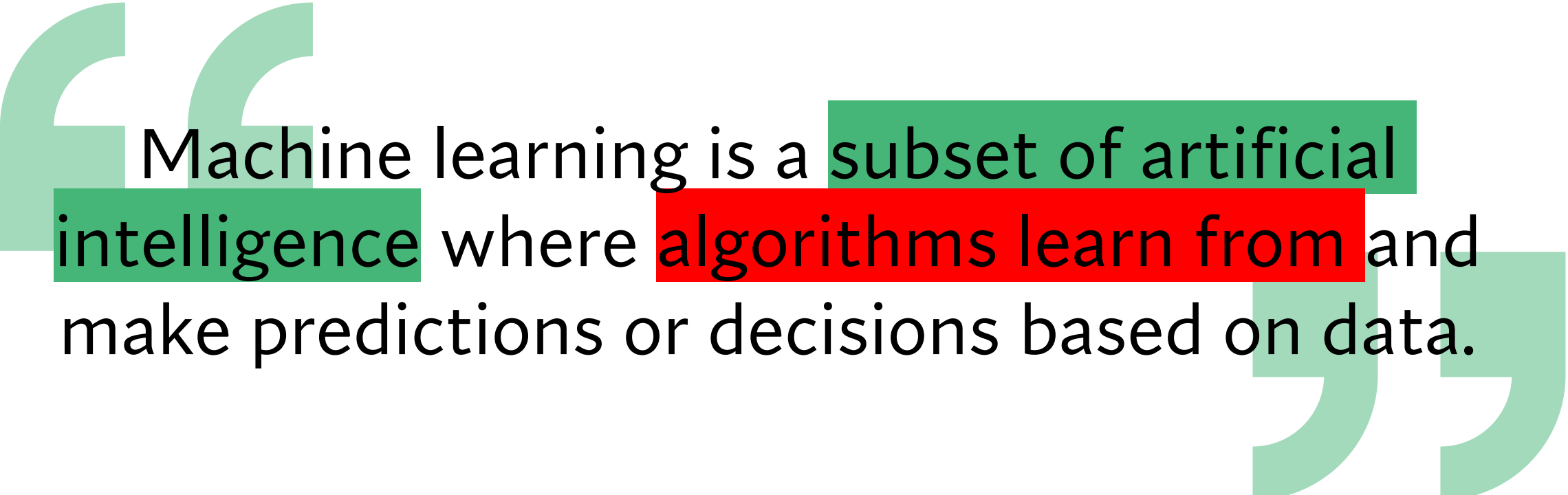


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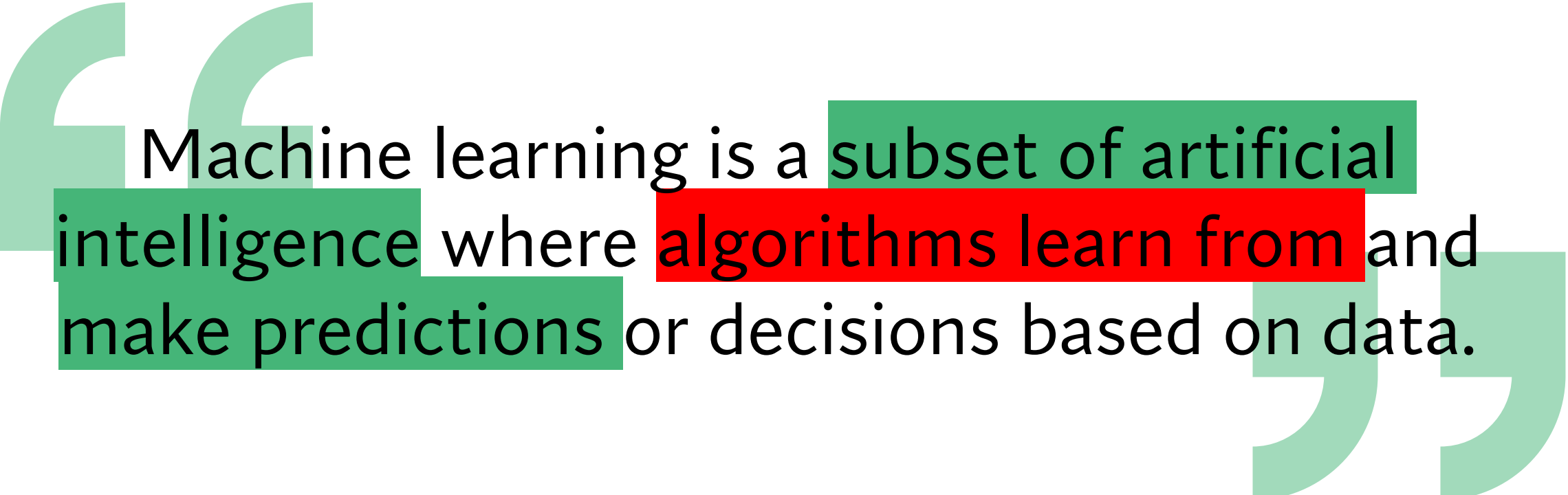


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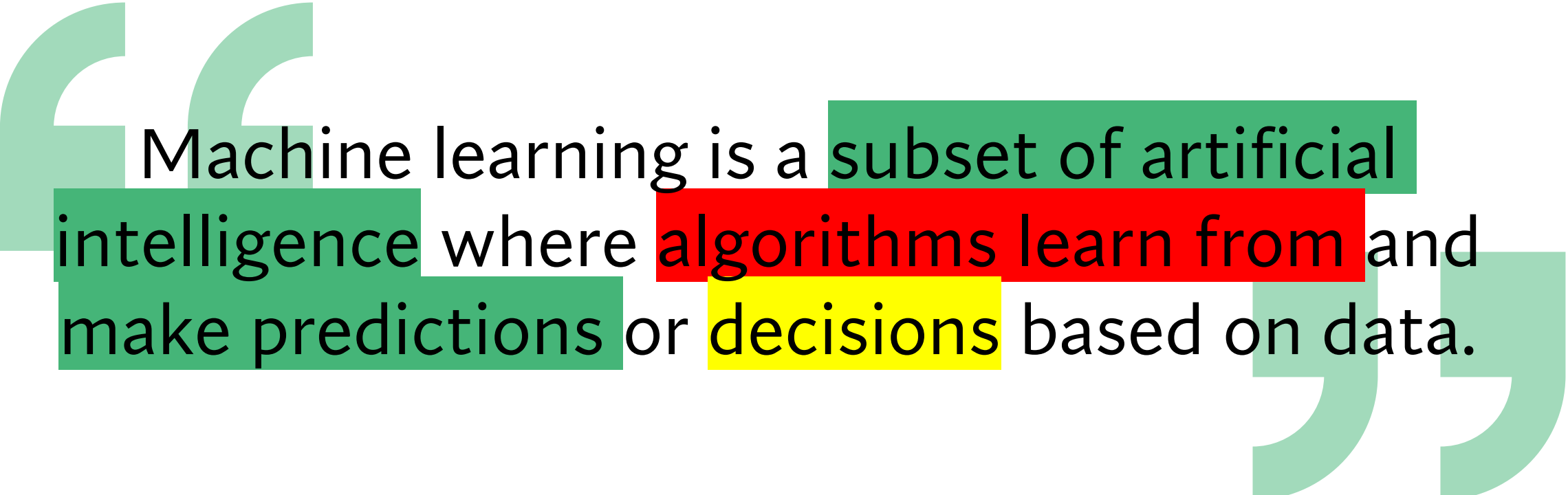


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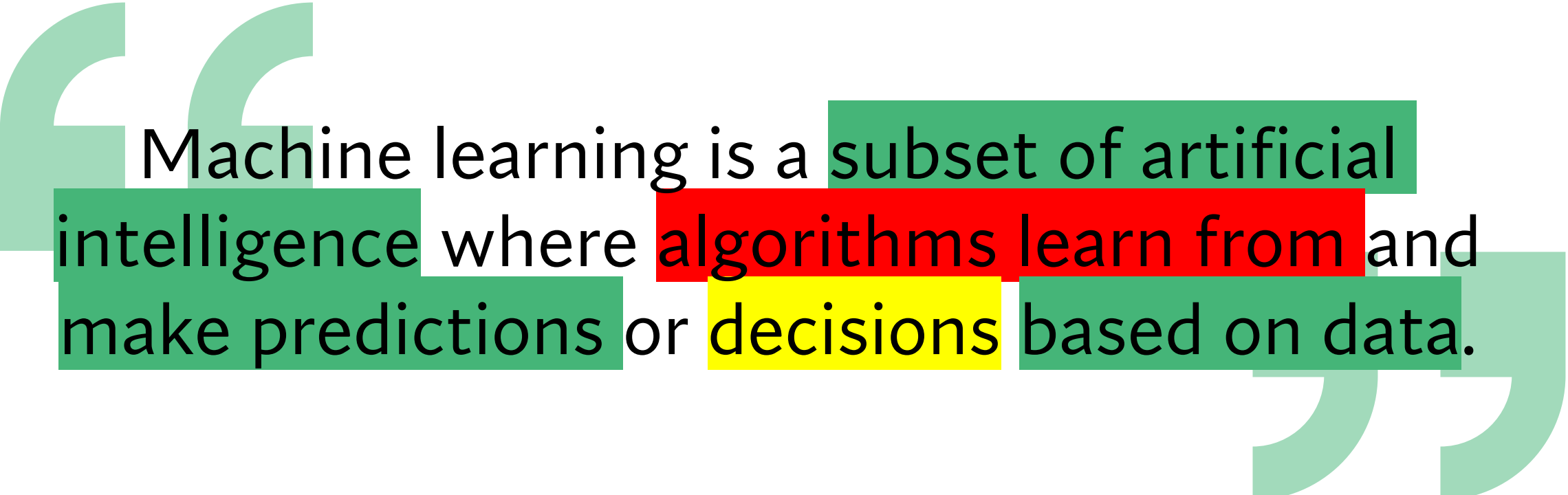


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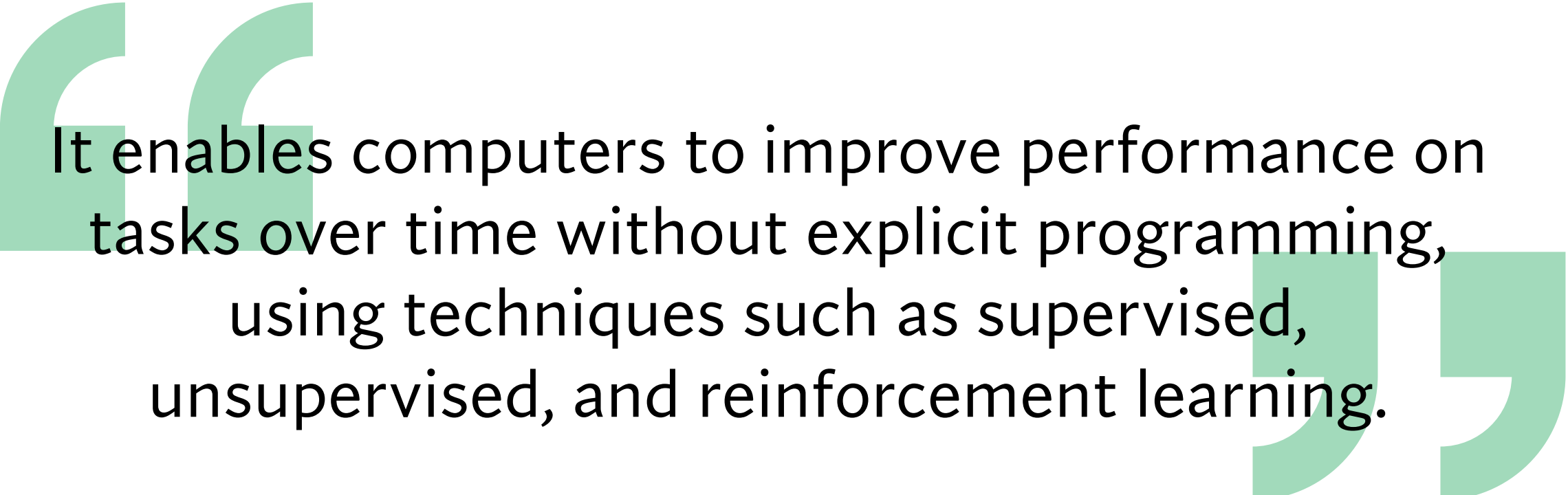
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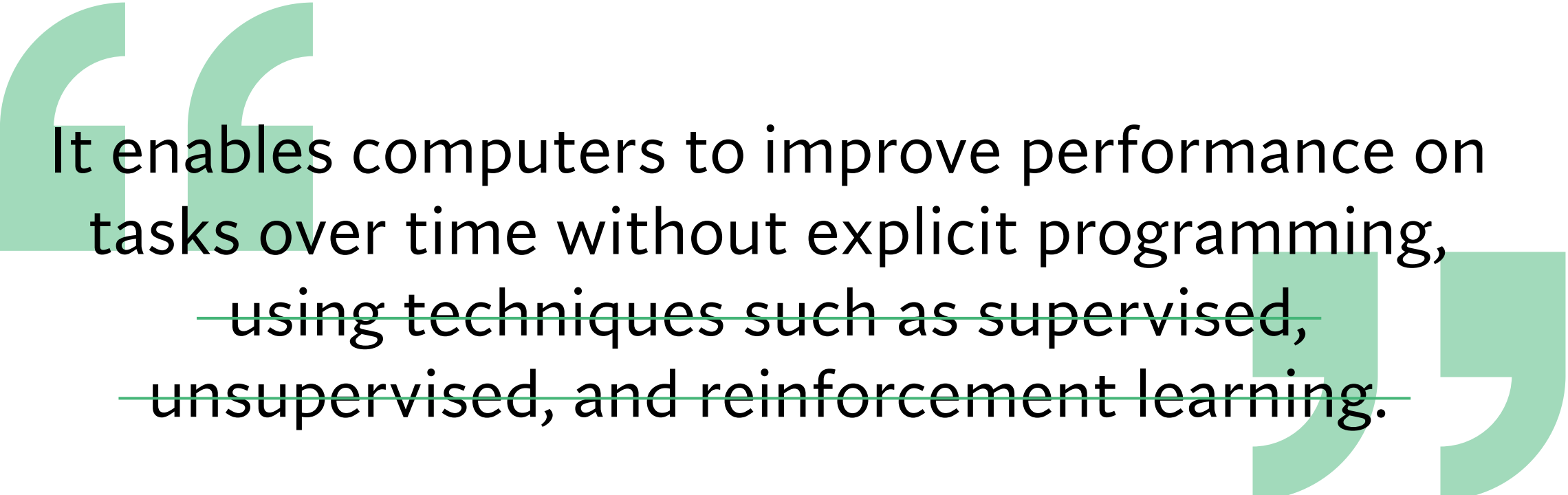


It enables computers to improve performance on tasks over time without explicit programming, using techniques such as supervised, unsupervised, and reinforcement learning.

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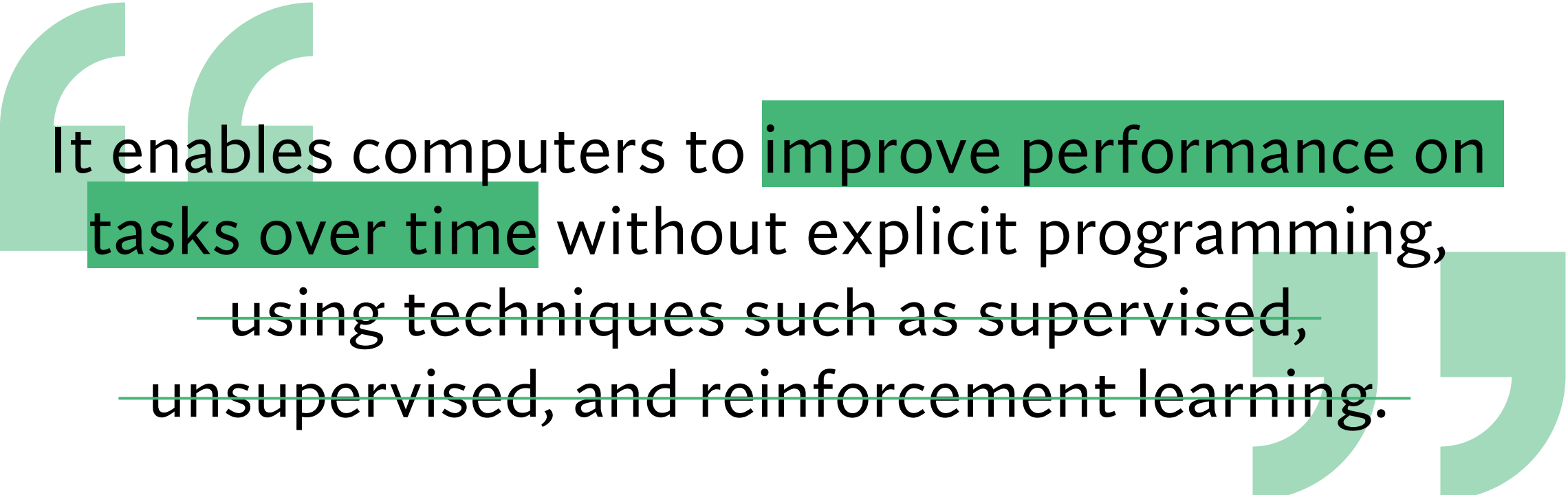


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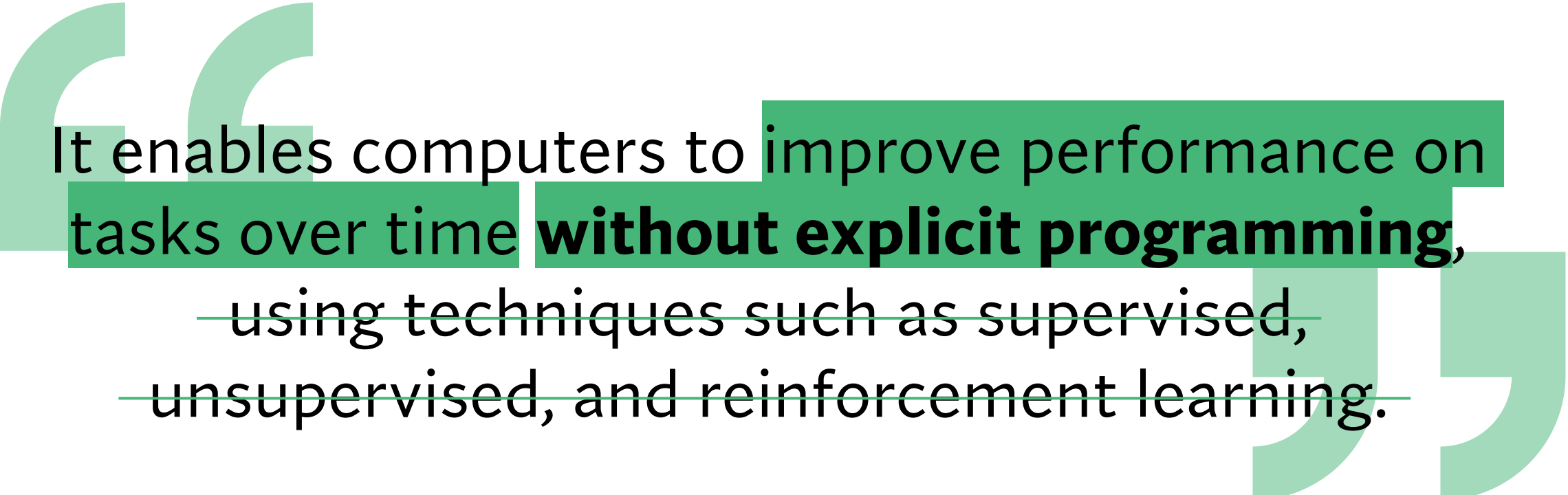


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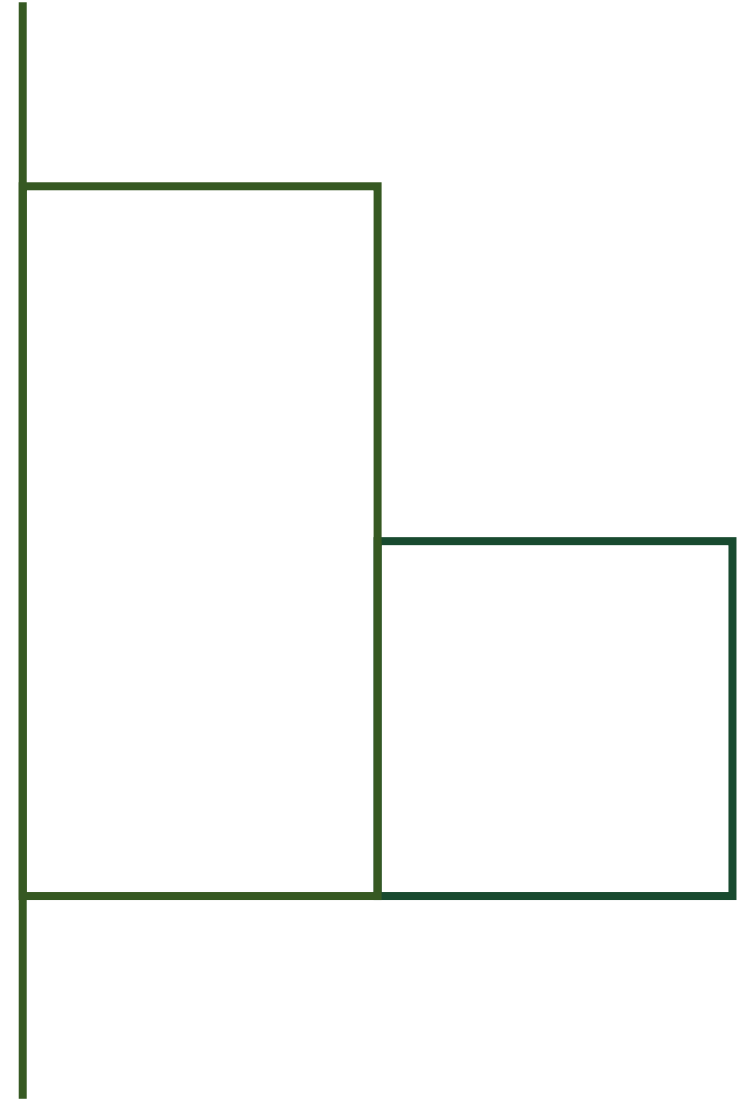
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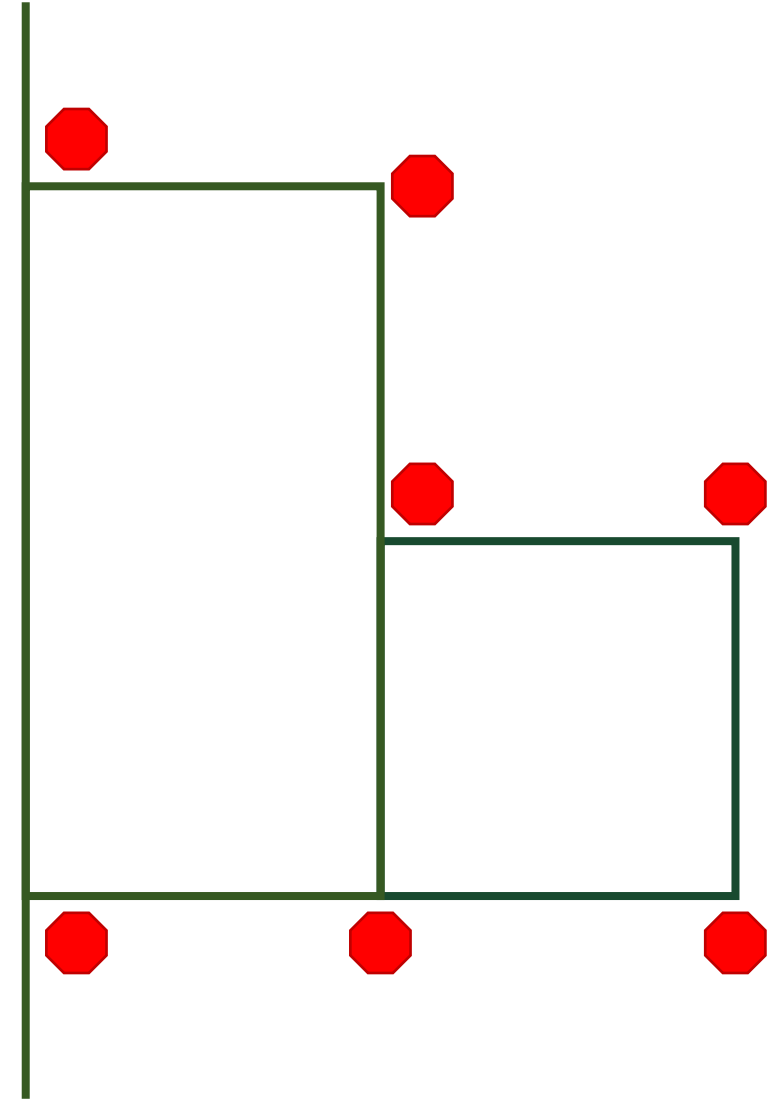
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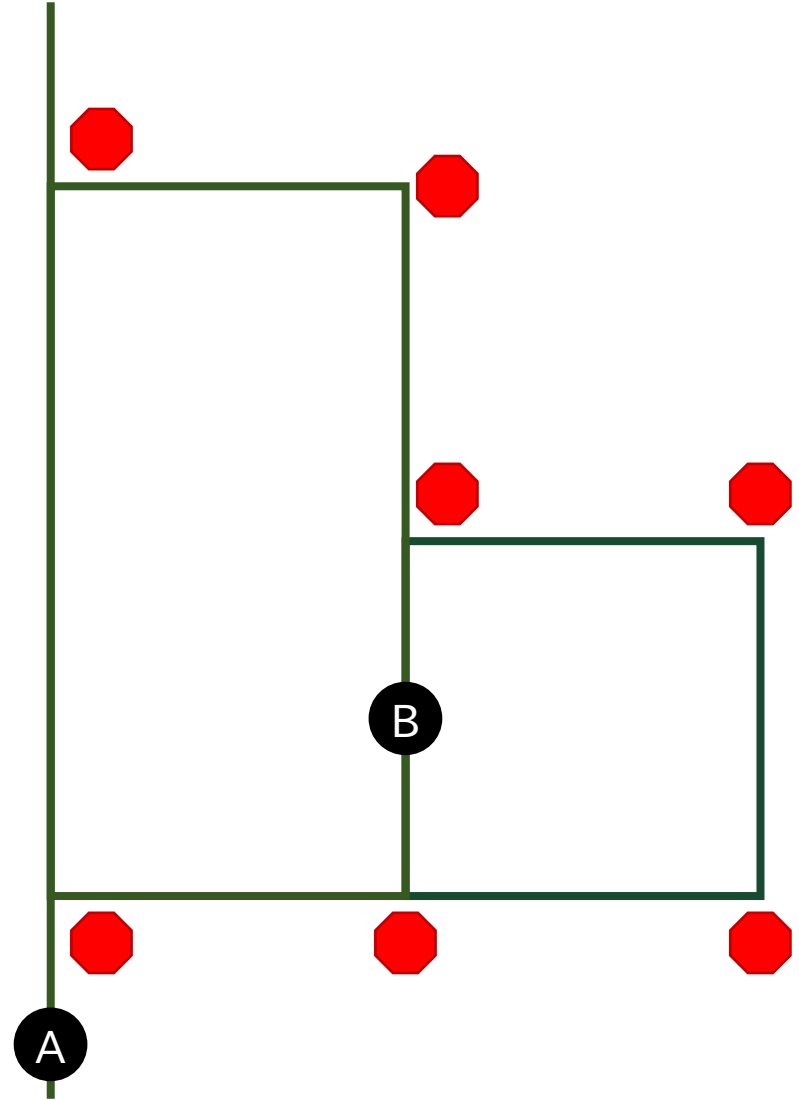
(according to ChatGPT)



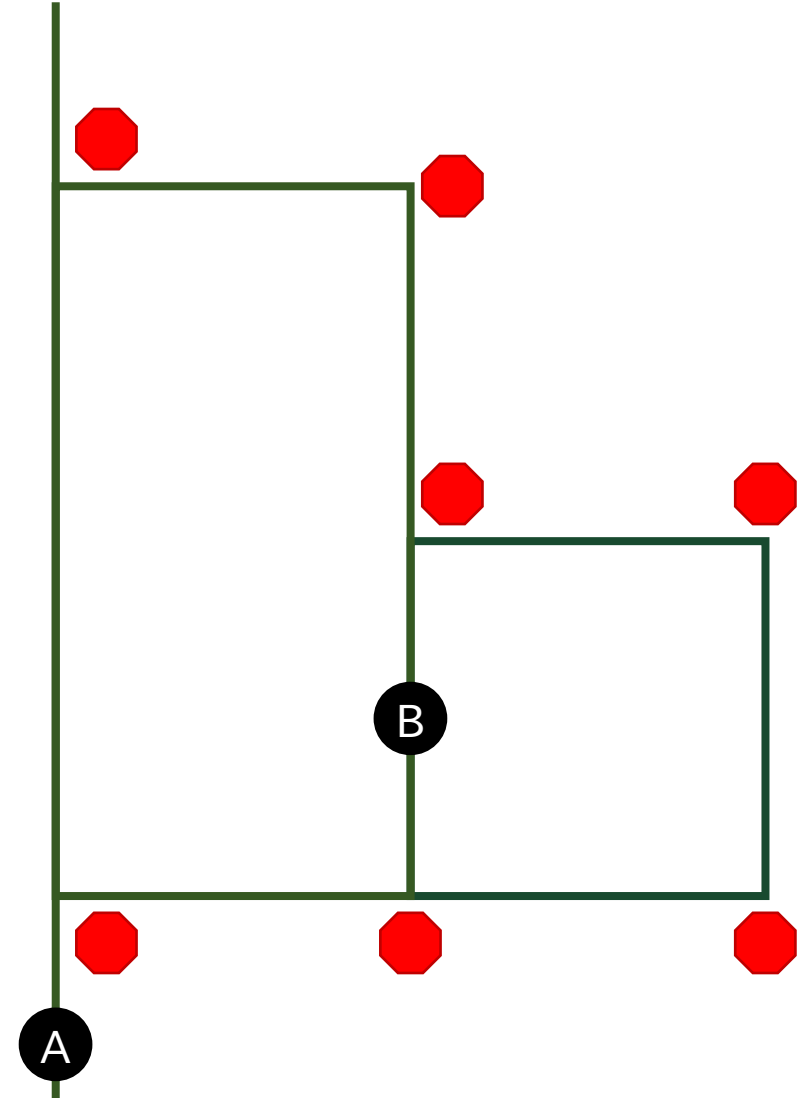
It enables computers to improve performance on tasks over time **without explicit programming**,  
— using techniques such as supervised,  
— unsupervised, and reinforcement learning.





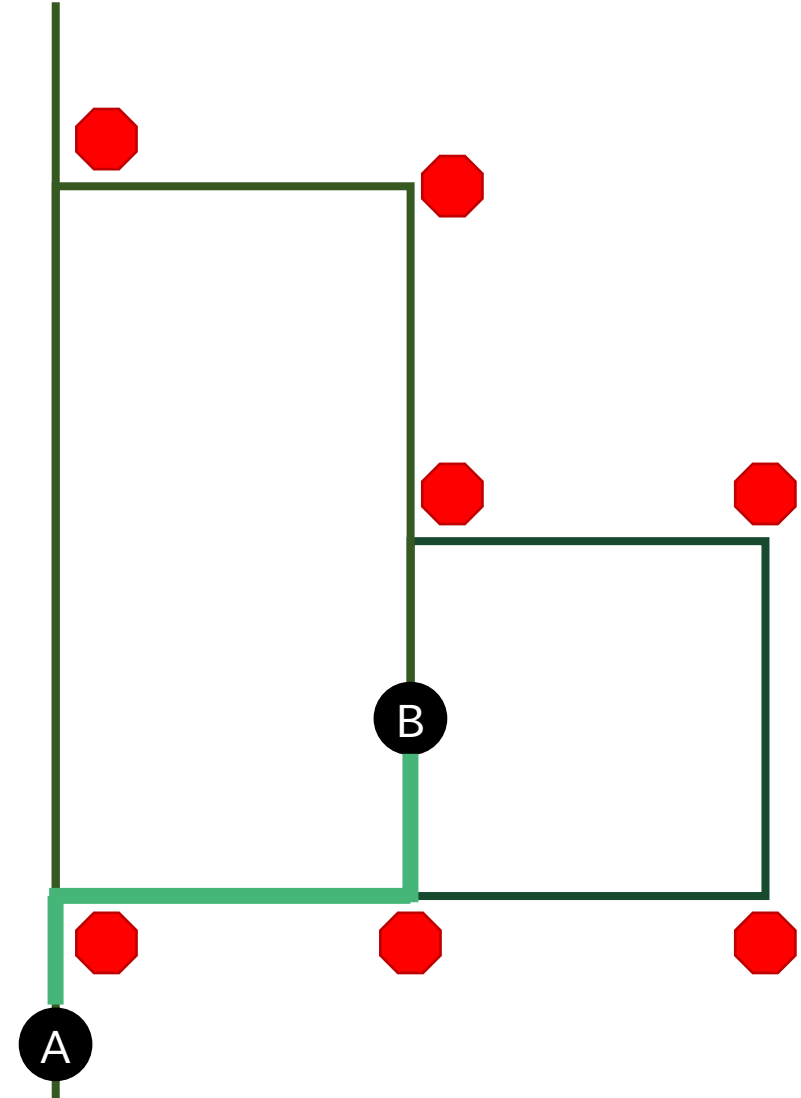


```
go_forward()
if can_turn_right:
    turn_right()
    go_forward()
    if can_turn_left:
        turn_left()
        go_forward()
else:
    go_forward()
    if can_turn_right:
        turn_right()
        go_forward()
        if can_turn_right:
            turn_right()
            go_forward()
            if can_go_straight:
                go_forward()
```

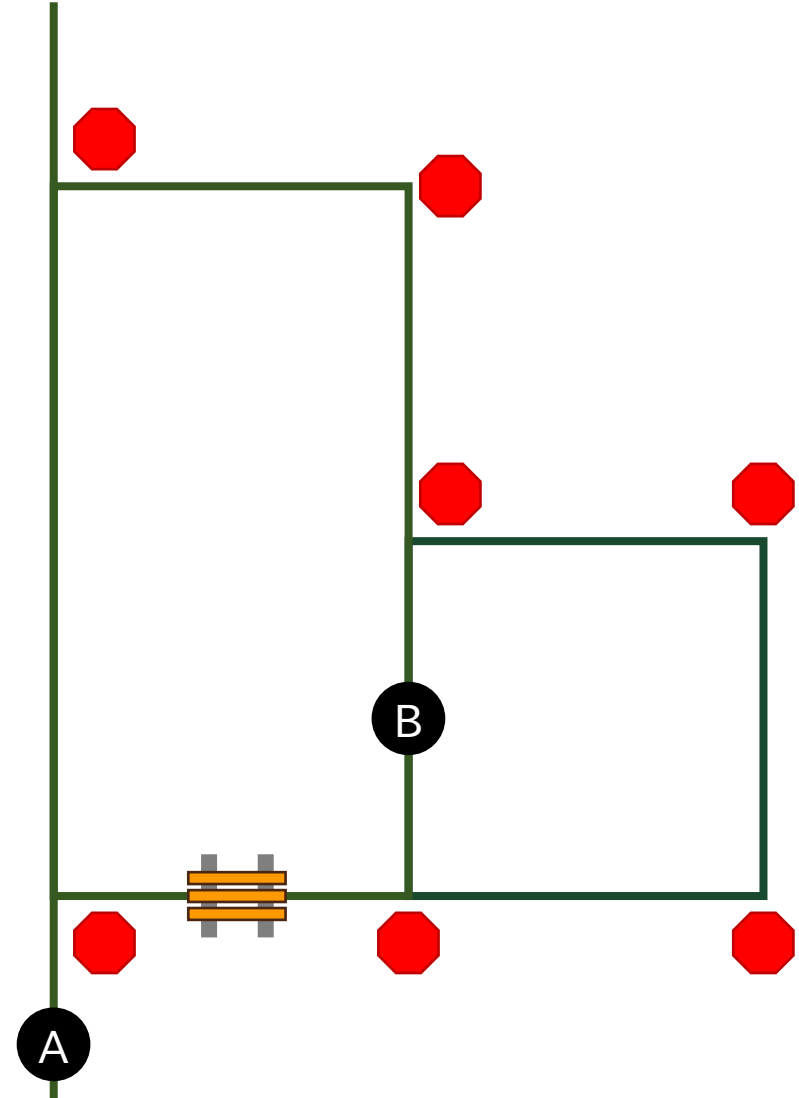




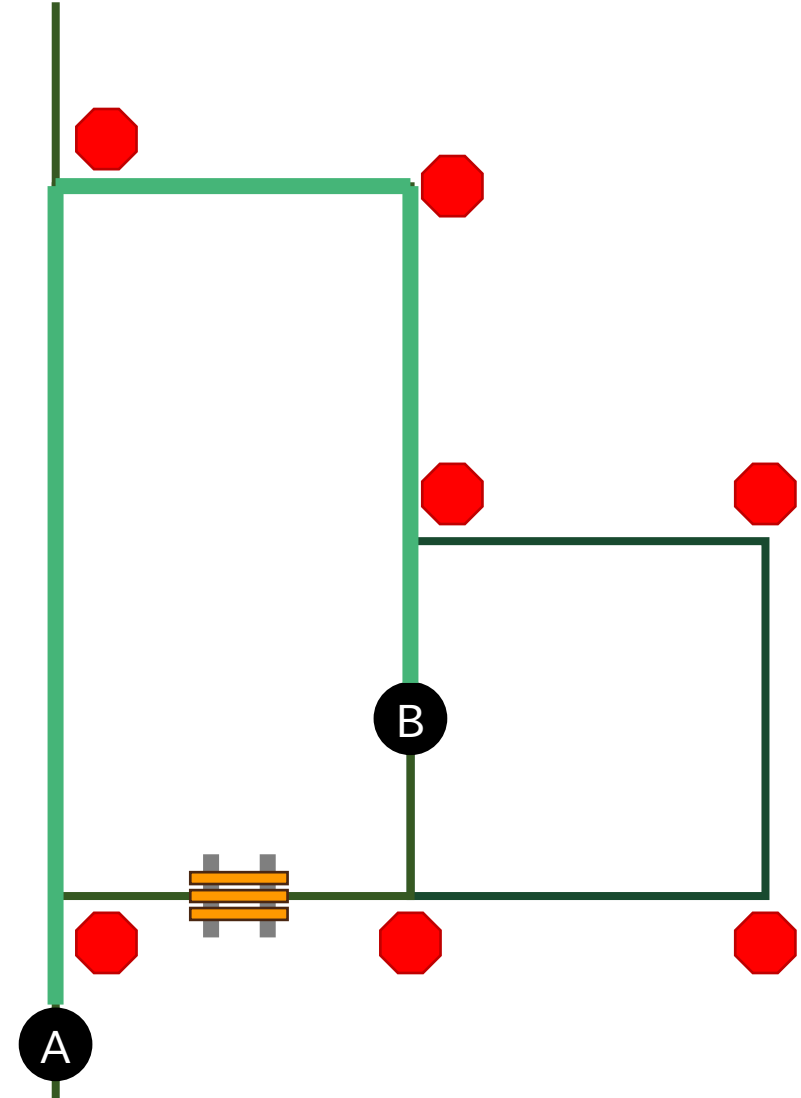
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        if can_turn_right:
            turn_right()
            go_forward()
            if can_go_straight:
                go_forward()
```



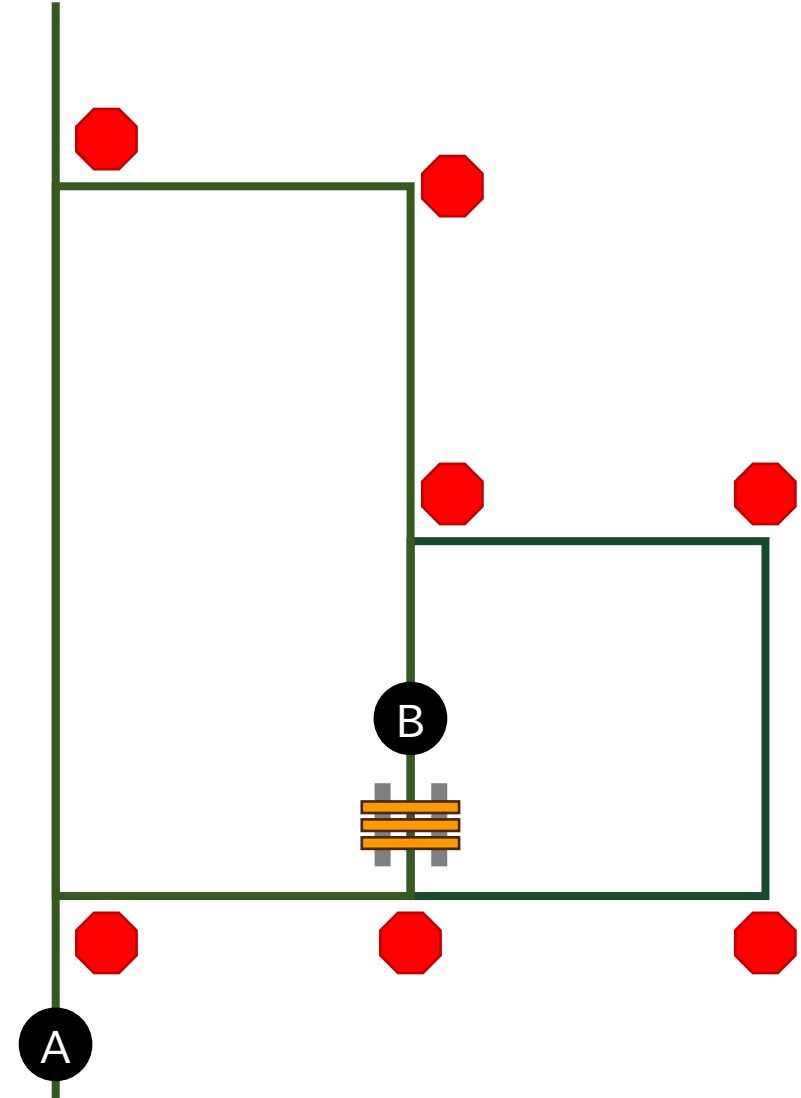
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            go_forward()
            if can_go_straight:
                go_forward()
```



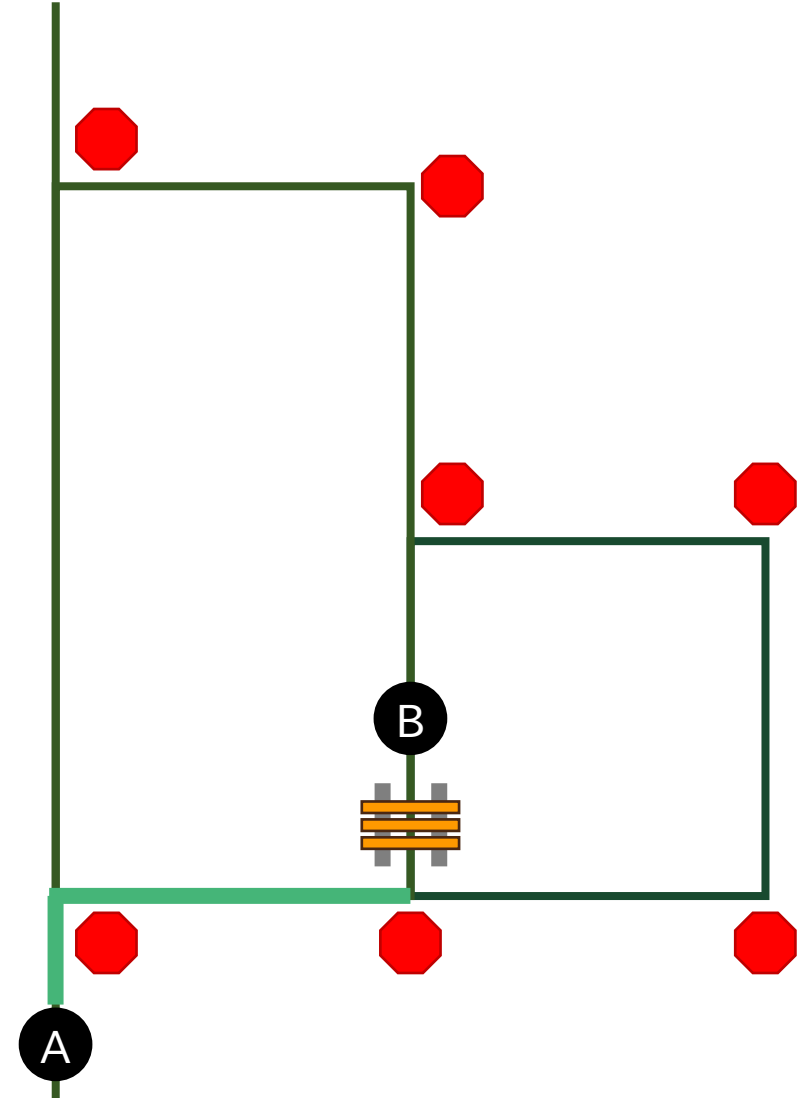
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            if can_go_straight:
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```



```
go_forward()
if can_turn_right:
    turn_right()
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else:
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        turn_right()
        go_forward()
        if can_turn_right:
            turn_right()
            go_forward()
            if can_go_straight:
                go_forward()
```



```
go_forward()
if can_turn_right:
    turn_right()
    go_forward()
    if can_turn_left: ???
        turn_left()
        go_forward()
else:
    go_forward()
    if can_turn_right:
        turn_right()
        go_forward()
        if can_turn_right:
            turn_right()
            go_forward()
            if can_go_straight:
                go_forward()
```



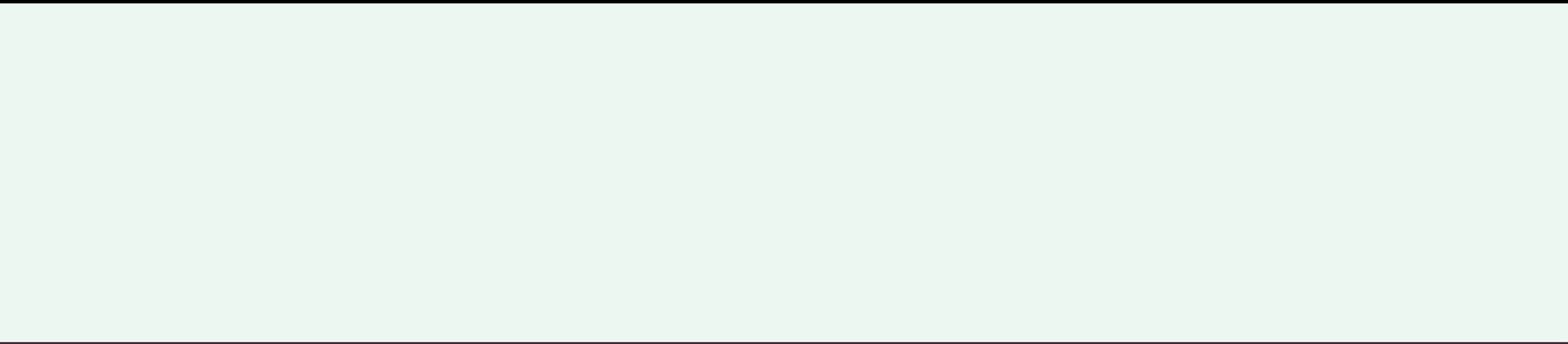
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Explicit programming means the developer is responsible for anticipating all relevant situations.

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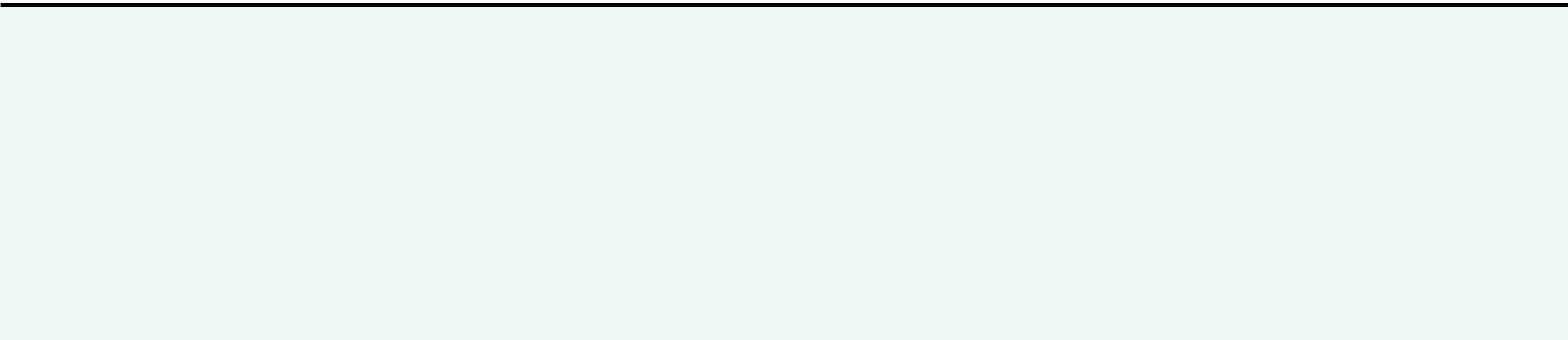
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Machine learning discovers all relevant situations by training a model based on data.



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A model is a mathematical representation of the “knowledge” derived by analyzing the data.

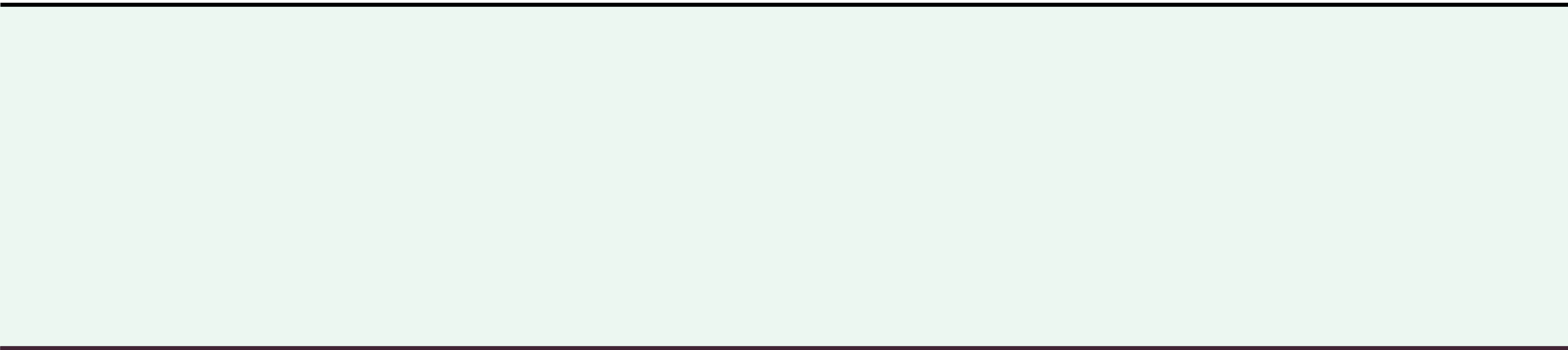


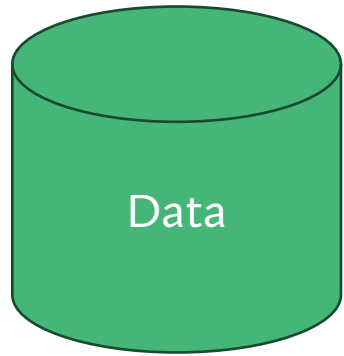


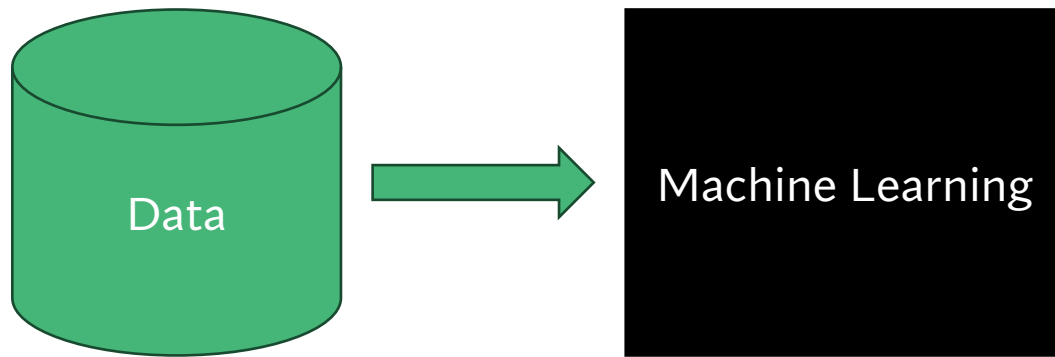
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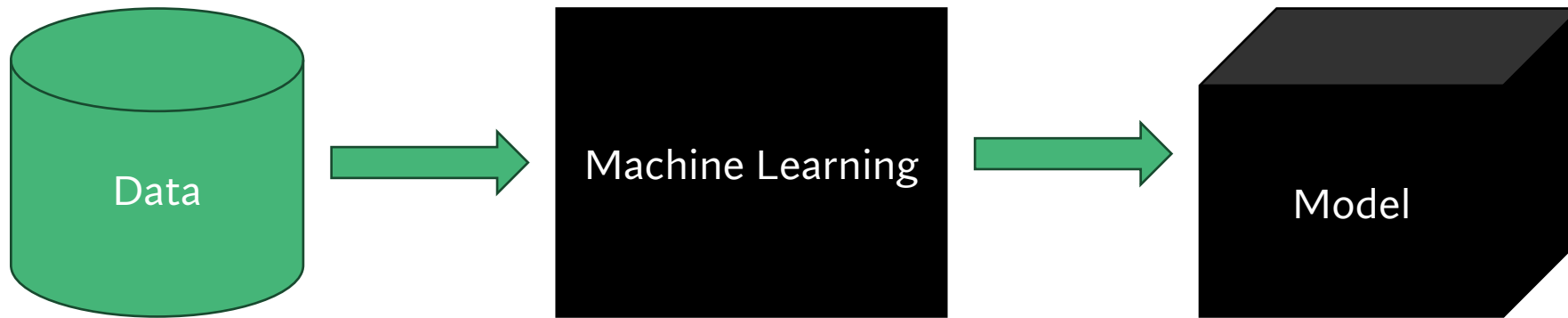
*big glob of numbers*

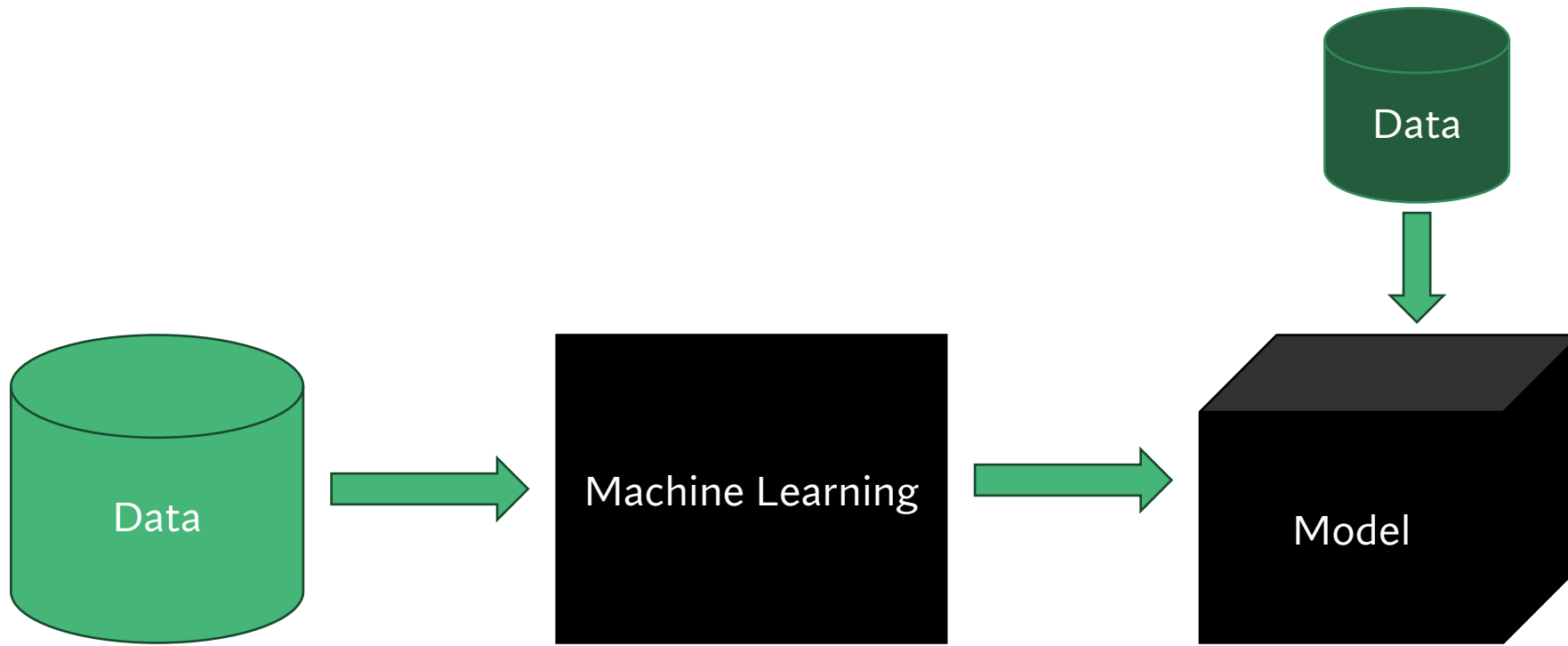
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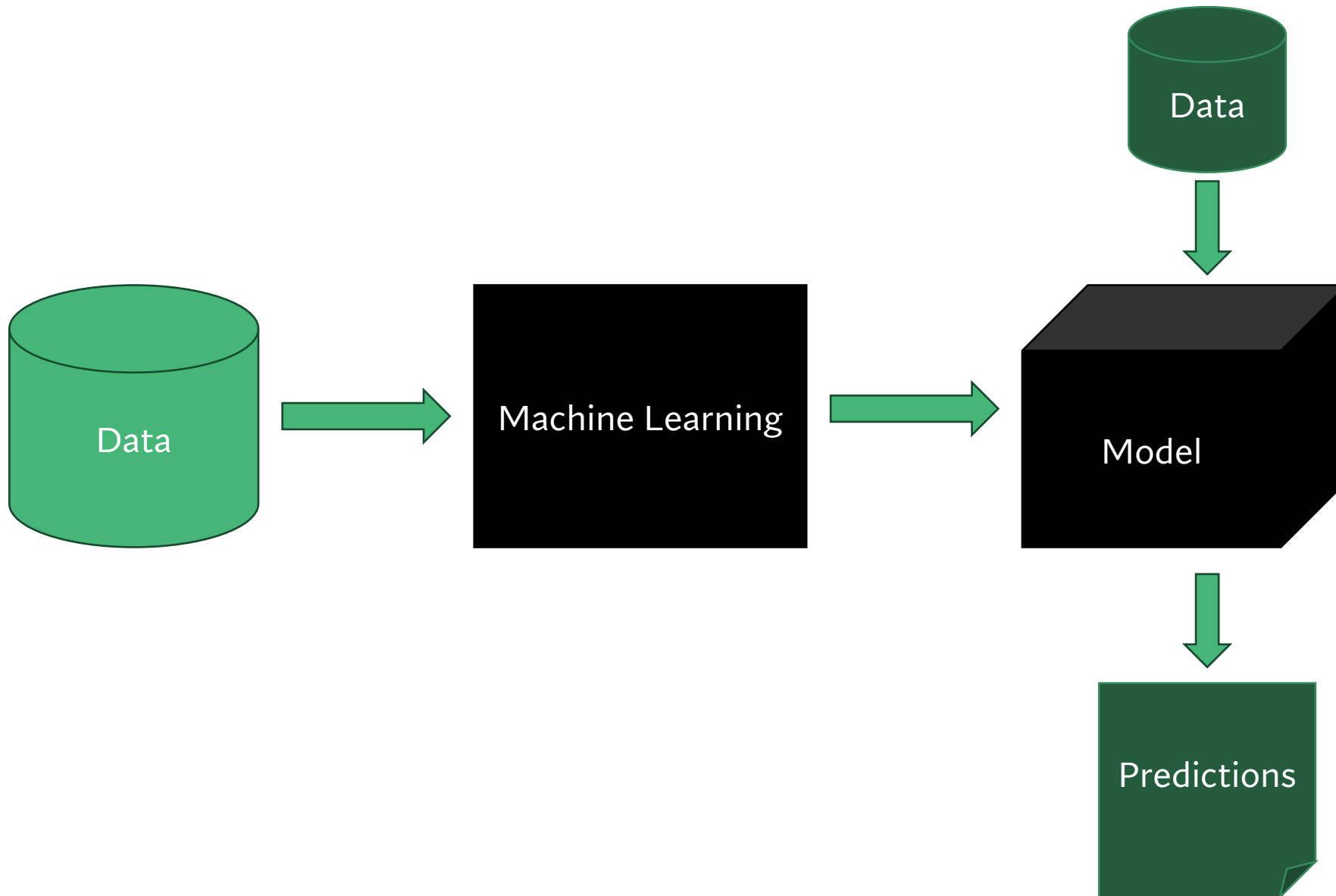












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A	B	C
2	2	4
14	59	73
0	0	0
50	-10	40
-2	-3	-5

---

A	B	C
2	2	4
14	59	73
0	0	0
50	-10	40
-2	-3	-5

$$A + B = C$$



---

A	B	C
2	2	4
14	59	73
0	0	0
50	-10	40
-2	-3	-5

$$A + B = C$$

$$21 + 2 = 23$$

---

A	B	C
2	2	4
14	59	73
0	0	0
50	-10	40
-2	-3	-5

$$A + B = C$$

$$21 + 2 = 23$$

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$$21 + 2 = 3 + 8 - 2 + 8 - 4 + 7 - 1 + 4$$

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# Artificial intelligence is not human intelligence

- We don't know enough about human intelligence to reproduce it
- The goal of artificial intelligence is not to reproduce human intelligence
- The goal of artificial intelligence (and thus machine learning) is to mimic human **response**
- As long as artificial intelligence and humans agree, the process is irrelevant
  - The end justifies the means

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# ARTIFICIAL INTELLIGENCE IS VERY ARTIFICIAL AND NOT THAT INTELLIGENT



Message ChatGPT



ChatGPT can make mistakes. Check important info.



## copilot noun

co·pi·lot    'kō-,pī-lət 🔊

[Synonyms of copilot >](#)

: a qualified pilot who assists or relieves the pilot **but is not in command**

Artificial intelligence should supplement, not replace, human intelligence.

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# scikit-learn

- Implementations of commonly used machine learning tasks
  - Classification
  - Regression
  - Clustering
- Follows a common pattern
  - Create an instance of a model class with optional hyperparameters
  - Fit the model to the training data
  - Score the model using the testing data
  - Make predictions using new data

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# scikit-learn

*DEMO*

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# Azure AI Services

- Add machine learning to almost any app without knowing anything about machine learning
- Models trained at Microsoft scale for common machine learning tasks
  - Sentiment analysis
  - Text translation
  - Text to speech
- Models exposed via REST APIs
- SDKs for popular languages



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# Azure AI Services

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*DEMO*

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# Questions, Comments, Concerns, Complaints

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# Thank you!