

Name:		School:	
Course:		Room Number:	
Unit Title: Exploring Artificial Intelligence & Machine Learning Lesson Title: Introduction to Machine Learning		Date: Class Length: 60 minutes	
Common Core State Standards: CCSS.ELA-LITERACY.SL.3.1: Engage effectively in a range of collaborative discussions with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly. CCSS.ELA-LITERACY.L.3.5: Demonstrate understanding of word relationships and nuances in word meanings. Next Generation Science Standards (NGSS): 3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. Computer Science Teachers Association (CSTA) Standards: 1B-IC-18: Discuss computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices. 1B-CS-02: Use appropriate terminology in identifying and describing the function of common physical components of computing systems. International Society for Technology in Education (ISTE) Standards: 1.6 Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals. 1.7 Global Collaborator: Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally Engineering Standards: Engineering Design (3-5-ETS1): Defining problems, developing solutions, and optimizing designs to meet specific needs.			
Objective: Students will: • Understand the basic concept of machine learning. • Identify how machine learning is used in everyday life. • Distinguish between supervised, unsupervised, and reinforcement learning. • Understand that machine learning systems learn from data to identify patterns, make predictions, or make decisions. • Participate in hands-on activities that model how machines sort, categorize, and learn from information. • Compare the ways humans and computers process and categorize information.			

Challenge Based Learning Alignment:

- **Big Idea:**

Learning from Data:

- Computers can use data, examples, patterns, and feedback to learn how to perform tasks and make decisions.

- **Essential Question(s):**

What is machine learning?

How can a computer learn from data?

What is the difference between supervised, unsupervised, and reinforcement learning?

How do humans and computers recognize and categorize patterns differently?

- **Challenge:**

Can you teach a machine how to recognize, sort, or categorize information?

Students investigate how training examples, categories, patterns, and feedback can help a machine improve its decisions. They then compare the machine's process with how humans learn and categorize information.

Success Criteria:

By the end of the lesson, students will be able to:

- Define machine learning in their own words.
- Explain how machine learning is connected to artificial intelligence.
- Explain that machine learning systems learn from data and patterns.
- Identify supervised, unsupervised, and reinforcement learning.
- Give at least one example of each type of machine learning.

Conceptual Understanding

Students should understand that:

- Machine learning is a branch of artificial intelligence.
- Machine learning allows computers to learn patterns from data rather than requiring every possible decision to be individually programmed.
- Supervised learning learns using labeled examples.
- Reinforcement learning learns through consequences, such as rewards and penalties.
- The quality of the information and feedback provided to a machine can influence what it learns.

Apple & AI tools: Teacher Tools: ● Presentation/Keynote ● Whiteboard and markers ● Kahoot ● ArtBot ● Internet-connected computer/iPad ● Machine-learning visuals/examples Student Tools: ● iPad, laptop, or other personal device ● ArtBot ● Kahoot ● Notebook/paper	Assessment Strategies: Formative Assessment: ● Prior-knowledge questioning ● Vocabulary checks ● Story comprehension questions ● Teacher observation ● ArtBot gameplay ● Student explanation of the three types of machine learning ● Sorting activity ● Group discussion ● Kahoot Closing Assessment: ● Exit ticket ● Student reflection ● Explanation of how ArtBot learned ● Identification of a real-world machine-learning application
Agenda: 1. Introduction to Machine Learning – 5 minutes ● Define machine learning ● Introduce learning objectives ● Compare machine learning and neural networks 2. Short Story with Cece – 10 minutes ● <i>Machine Learning Expedition: Full Speed Ahead</i> ● Review vocabulary and examples 3. ArtBot Gameplay – 15 minutes ● Supervised learning ● Unsupervised learning ● Reinforcement learning ● Train and interact with ArtBot 4. Real World Applications & Discussions – 10 minutes ● Voice assistants ● Gaming ● Online shopping ● Human vs. computer processing	

5. Sorting Activity – 10 minutes

- Categorize information
- Compare human sorting to machine learning

6. Kahoot – 5 minutes

7. Closing Discussion & Reflection – 5 minutes

General Modifications:

Equitable & Ethical AI Use	Real-World AI Connections	Building Ethical Reasoning Use of AI	Student Voice in Ethical AI Design
Students will learn that machine learning systems depend on the information and examples used to train them. Students will consider how the information given to a system can influence the patterns it recognizes and decisions it makes.	Students connect machine learning to: • Siri and other voice assistants • Alexa • Video games • Online shopping recommendations • Image recognition • Robotics	• What happens if a machine is trained with incorrect information? • What happens if the training examples don't represent everyone? • Can a machine make a mistake even after being trained? • Should people always trust a computer's prediction?	Students discuss how they would train a machine to make better decisions. Ask: <i>"If you were responsible for training an AI system, what examples would you give to make sure it will be learning correctly?"</i> Students can also suggest rules for making a machine-learning system more accurate and fair.

Check for AI Ethics Emphasis

Yes, students will examine how machines can learn from data and compare the strengths and limitations of human and computer decision making. Additional discussion questions introduce accuracy, fairness, diverse training data, and human oversight.

ENGAGE	INVESTIGATE	ACT	Assessment
Machine Learning Expedition Begin with: <i>"Can a computer actually learn?"</i> Have students vote Yes / No / Not Sure. Follow with: • How do people learn something new? • Can a computer learn the same way? • What information would we need to give a computer so it could learn? Introduce machine learning as a branch of AI in which computers learn from data and patterns. Read <i>"Machine Learning Expedition: Full Speed Ahead."</i> Students listen for: • Machine-learning vocabulary • Examples of machines learning • Data • Patterns	Train the Machine: ArtBot <i>Introduce the three types of machine learning:</i> Supervised Learning: Learning from labeled examples. Example: "This picture is a cat." "This picture is a dog." Unsupervised Learning: The computer receives information without labels and attempts to identify patterns or groups. Reinforcement Learning: The computer learns through rewards and penalties based on its actions. Then introduce ArtBot. Students use training data and feedback to help the AI identify and collect artwork. The guide explains that player feedback helps ArtBot improve its outputs over time. While students play, have them investigate: • What information are you giving	Humans vs. Machines: Sorting Challenge This activity is especially useful for your ACT section because students apply the concepts without simply playing another digital game. Divide students into small groups. Provide nouns that students must classify into: • Person • Place • Thing • Idea Have groups sort the words. Then compare answers. Ask: • How did you decide which category each word belonged in? • Did everyone categorize every word the same way? • Which words were difficult? • What patterns did you use? • Could a computer complete this task?	Have each group explain: 1. How they categorized their information. 2. What patterns they used. 3. How a machine might complete the same task. 4. One possible mistake the machine could make.

	ArtBot? • What happens after you provide feedback? • Does ArtBot improve? • What mistakes does it make? • Which type of machine learning do you think you are observing? • What would happen if you gave ArtBot incorrect information?	Have each group explain: 1. How they categorized their information. 2. What patterns they used. 3. How a machine might complete the same task. 4. One possible mistake the machine could make.	
Activity 1 (ENGAGE – 30 minutes) <i>"What is machine learning, and what does a computer need in order to learn?"</i>	Activity 2 (INVESTIGATE – 60 minutes) Students complete: <i>"I think ArtBot demonstrates _____ learning because _____."</i> Students should support their answer using evidence from the game.	Activity 3 (ACT – 60 minutes)	Assessment Formative • Vocabulary review • Cece story discussion • ArtBot observations • Sorting activity • Peer/group discussion • Kahoot

Details / Activities

Wrap Up/Reflection/Closure

Supportive Models:	Reflective Practice:	Growth Mindset:	Assessment:
• Teacher modeling • Visual vocabulary cards • Think-aloud demonstrations • Labeled examples • Sorting demonstrations • ArtBot demonstration before independent use • Partner learning • Small-group collaboration	Students reflect on: • What they thought machine learning meant before the lesson. • How their understanding changed. • Which type of machine learning was easiest to understand. • What they learned from ArtBot. • How their sorting process was similar to or different from a computer's.	Emphasize: • Learning requires examples, practice, and feedback. • Incorrect answers provide information that can help improve future attempts. • ArtBot may not identify everything correctly on its first attempt. • Students may categorize something incorrectly and then revise their decision. • Machine-learning systems can also improve based on additional data and feedback.	Exit Ticket Students answer: 1. What is machine learning? 2. Name one type of machine learning. 3. Give one example of machine learning in everyday life. 4. How does data help a computer learn? 5. What is one thing humans may do better than computers or computers may do better than humans?

Closing Remarks:

Machine learning allows computers to learn from data, recognize patterns, and improve how they complete certain tasks. Today, we explored supervised, unsupervised, and reinforcement learning and saw how machine learning appears in games, voice assistants, shopping recommendations, and other technologies. As we continue exploring AI, remember that computers can process information quickly, but humans are still responsible for deciding how these technologies are trained, designed, and used.