

## Lesson 1.1

3.7.2020

# What is AI?

### DAILY OBJECTIVE

In this lesson, students will learn about the basic concepts behind AI and Machine Learning, some initial definitions of key concepts, and have an introduction to the TEALS post-AP Exam curriculum.

### MATERIALS

#### Educator

- Whiteboard/Chalkboard For charting Student Ideas

#### Students

- Note taking device or paper and pencil.
- Computer to access example resources.

### PREP

Educators should review the examples provided within the lesson plan prior to conducting the lesson.

### DEFINITIONS

1. **AI (Artificial Intelligence):** A computer system able to perform tasks by taking in data from an outside source, and making a decision based on that data. Often, AI systems will solve tasks normally solvable by humans.
2. **ML (Machine Learning):** In short, ML is AI. Machine Learning refers to an AI computer system that can perform a specific task without relying on specific instructions. ML Algorithms use patterns and learn how to solve these tasks through repeated attempts to solve those tasks instead through the use of a large amount of input data. In this course, we'll use the term AI in place of ML!
3. **Azure Cognitive Services:** A service run by Microsoft that enables users to use complex artificial intelligence systems in their own work. We will be using Azure Cognitive Services in today's demos, and when making our own projects.

4. **MVP:** Minimum Viable Product. Usually a very minimal prototype of a product you wish to develop that demonstrates the core capabilities of that project.

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## LESSON PLAN

### Section 1: Introduction

<b>Objective</b>	Teachers will discuss the Microsoft TEALS end of year project with students and provide a firm understanding of the project's objectives and duration. After a quick introduction, students will complete a short activity.
<b>Duration</b>	5-10 Minutes
<b>Class Style</b>	Computers should be away. The Classroom should be set up for a full room discussion.
<b>Materials</b>	Note Taking Materials

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#### 1.1. WELCOME

We'll start by introducing students to the Microsoft TEALS end of semester project. Be sure to go over the following with your students.

- a. **Students will be creating interactive projects that utilize AI systems!**
  - i. Students can choose their own topic, Potential Projects Include:
    1. Prototype Applications
    2. Games
    3. Interactive Artworks
    4. Projects that aim to tackle a social issue
  - ii. We'll be designing these projects from beginning to end!

- b. **We'll be going over the basics of Artificial Intelligence in the course**
  - i. This is not designed as a full introduction to AI, but rather a first exposure to how Artificial Intelligence can be used by students of all skill levels!
- c. **We'll be discussing how AI affects our lives.**
- d. **We'll be learning to use new tools with our programming and Computer Science Experience**
  - i. Primarily, we will use the Wick Editor, a free animation and game creation tool.

## 1.2 DISCOVERY ACTIVITY

<b>A</b>	<b>5 mins</b>	Students will take 5 minutes to write down their journey over the last 24 hours, from the time they woke up to the time they got to this class and identify every single time they interacted with AI. Note that it is ok for students to mark down interactions they believe used AI but are unsure.
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## Section 2: Classroom Discussion on AI

<b>Objective</b>	Students will engage in a discussion centered around definitions of AI, and a follow up discussion of AI in their daily lives. This discussion aims to familiarize students with how AI is commonly used.
<b>Duration</b>	15 Minutes
<b>Class Style</b>	Computers should be away. The Classroom should be setup for a full room discussion.
<b>Materials</b>	None



## 2.1 RECOUNTING THE DAY

Students should have recorded a number of interesting interactions throughout their day in the last activity.

1. Start by asking for a student to recount their day and describe their interactions with AI.
  - a. Were there any surprises?
2. Ask other students to recount their days.
  - a. Were there any similar interactions? Did multiple students encounter the same systems?
  - b. Were there any interactions shared with others that students didn't realize they missed?
  - c. Were there any points throughout the day that could have been improved by some AI intervention?

## 2.2 CONSIDERING EXAMPLES

As the discussion winds down, ask the students to provide popular examples of AI systems that they may not have interacted with during the last day. Common Examples Include:

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|---|--|
| A. Sales suggestions on e-commerce websites (such as on Amazon)   | F. Medical Assistive Devices (computer systems that can spot tumors on an image) |
| B. Search Suggestions Systems (Such as Bing and Google)   | G. Spam filters (Such as on Live Chats on Twitch, or in Email)                   |
| C. Self Driving Cars and Car Assistive Systems  | H. Plagiarism checkers   |
| D. Autopilot in planes  | I. Fraud detection for banks   |
| E. Ridesharing Apps (Such as Lyft and Uber determining the price of a ride, which driver to send you, etc.) | J. Snapchat Filters  |
|   | K. Image Filters (On apps like Instagram and Snapchat)                           |

### **Course Note: AI vs Machine Learning vs Deep Learning**

Students may have heard multiple terms for Artificial Intelligence in their daily lives such as Machine Learning and Deep Learning. Machine Learning and Deep Learning are subsets of Artificial Intelligence. While there are some differences in their approaches, AI is a fine term to refer to them all! We've supplied a few definitions above as further reading and explanation, but more in-depth discussions on this topic are considered out of scope for this unit.

## Section 3: Interacting with AI Systems

<b>Objective</b>	Students will explore several interactive examples of AI systems and discuss how they believe they work.
<b>Duration</b>	20 Minutes
<b>Class Style</b>	Students are broken into groups of 2-3. Students have access to computers and are rotating the role of “driver” for each example they examine.
<b>Materials</b>	Students should have either a digital or physical copy of the question worksheet in their student guide. Students will answer a series of questions on their worksheets.

### 3.1 EXPLORING INTERACTIVE PROJECTS

1. Break students into groups of 2-3.
2. Encourage students to explore and interact with these demos of Azure Cognitive Services systems.

Demo	Link
Text Analytics	<a href="aka.ms/AzureTextAnalyticsDemoTEALS">aka.ms/AzureTextAnalyticsDemoTEALS</a>
Computer Vision	<a href="aka.ms/AzureComputerVisionDemoTEALS">aka.ms/AzureComputerVisionDemoTEALS</a>
Face API	<a href="aka.ms/AzureFaceAPIDemoTEALS">aka.ms/AzureFaceAPIDemoTEALS</a>

## 3.2 DISCUSSING THE INTERACTIONS

Have students discuss the demos above, play with them, and answer these questions for each demo on their worksheets:

*How do you think the system works?*

Students should provide educated guesses to what they believe the system is doing to achieve their results. We're not looking for perfect answers, but rather responses that allude to how they may create an interaction like this themselves.

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*What information do you believe this system is considering when sending back results?*

Responses should change based on the example being considered.

1. **Text Analysis:** Number of "positive" and "negative words. Punctuation (i.e. ! Marks may be positive or negative).
2. **Speech Recognition:** Intonation, pitch, volume.
3. **Computer Vision:** Color, Blobs, Entities
4. **Face Detection:** Colors, Common Elements (eyes, nose, mouth)

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*What was the hardest thing to classify correctly?*

Students should identify examples that didn't produce perfect results when input to the system.

1. Which input yielded the lowest accuracy for each demo?
2. Why do you think this happened?
3. These systems can improve over time!

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*What was the most impressive thing the demos classified?*

Students should identify examples that produced very good results when input to the system.

1. Were you surprised that the system was able to identify anything in particular?

### 3.3 (Optional) Reviewing Additional Demos

1. With any spare time, have students explore the remaining Azure Cognitive Services Demos here: [aka.ms/AllCognitiveServicesDemosTEALS](https://aka.ms/AllCognitiveServicesDemosTEALS)
2. Ask them to find a specific demo and answer the above questions about it. Particularly appropriate options include the “Video Indexer Demo”, “Ink Recognizer”, “Speech Translation”, “Text to Speech”, and the “Content Moderator” demos.



# Common Misconceptions

Below are some common misconceptions that may appear in discussion around today's content.

## 1. “AI can solve any problem” (Narrow vs General AI)

Many people believe that Artificial Intelligence refers to a machine that can act very similarly to a human, in that it can solve any problem. In fact, there are two major subsets of artificial intelligence which most systems fall into “Narrow AI” and “General AI”.

- a. **“Narrow AI”** refers to a specific type of AI that can solve a specific problem, often better than a human can in certain contexts. Examples of Narrow AI include self-driving cars, spam filters on your email, and the way pages are ranked on a search engine.
- b. **“General AI”** refers to an Artificial Intelligence system that can apply its knowledge to any problem a human being can solve, much like a human can use their own experience to solve problems they've never come across before. This type of AI is currently in the research phase and has only been replicated at a very small scale. Examples of General AI often appear in science fiction, such as “Jarvis” in the Iron Man series.

## 2. “Isn't AI just a bunch of sensors?”

The core difference between an AI system and sensors is the “intelligent” aspect of making a decision or recommendation based on data gathered from sensors, and other input sources! Refer to the example in the student guide for more information on this.

## 3. AI is “smart”

While it may seem at first glance that an AI system is truly “smart”, these systems are more often than not creating recommendations based off of the data that has been previously fed into the system. An AI is only as good as its data, so incomplete or biased sources can negatively impact the quality of a result. Consider these outcomes truly as recommendations, rather than as absolute truths!

## COMMON PITFALLS

### 1. Balancing learning and play.

- a. When exposed to the demos, it's important to allow students to find examples that are particularly interesting to them while ensuring they're staying on task. Make sure students are answering questions as they play with the demos.

## SUCCESS CRITERIA

These success criteria are a simple way to ensure students are on track. They are designed to help educators guide conversations and example development between each day's content.

Discussion	Exploration	Application
Students have engaged in discussion around all example areas. Students can express considerations of the successful and challenging elements of the AI examples they've used. Students can formulate examples of AI/ML in their daily lives.	Students have explored and reviewed all provided examples and have answered worksheet questions for all provided examples.	Students can conceive of AI examples that are not yet a part of their lives but may be in the future. Students can consider problems that AI researchers are currently working to solve. Students are able to recount interactions with AI in their daily lives