

<b>Lesson Title</b>	<b>Machine Learning and Artificial Intelligence Reflection</b>
<b>Sequence</b>	<b>6 of 6</b>
<b>Duration</b>	<ul style="list-style-type: none"> <li>● 45 minutes to write and reflect</li> <li>● 45 minutes to peer review and revise</li> </ul>
<b>Materials</b>	<ul style="list-style-type: none"> <li>● Student documentation from earlier tasks</li> </ul>
<b>Objectives</b>	<b>Students will reflect on how their understanding of machine learning and artificial intelligence have developed during this module. They will communicate the connections they have made between the existing technology they already interact with, the less abstract MNIST code provided, and how the existing technology might work behind the scenes. Students will communicate their experience with an iterative design process while making modifications to supplied code.</b>
<b>Standards</b>	<p><b>Indiana</b></p> <ul style="list-style-type: none"> <li>● CSII-2.4 Analyze the work of peers and provide feedback</li> <li>● CSII-6.1 Describe the function of a computing artifact</li> <li>● CSII-6.2 Identify the purposes of a computing artifact</li> </ul> <p><b>ITEEA</b></p> <ul style="list-style-type: none"> <li>● 3 Students will develop an understanding of the relationship among technologies and the connections between technology and other fields of study.</li> <li>● 10 Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.</li> <li>● 11 Students will develop the abilities to apply the design process</li> <li>● 13 Students will develop the abilities to assess the impact of products and systems.</li> </ul> <p><b>CSTA</b></p> <ul style="list-style-type: none"> <li>● 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. (P7.2)</li> </ul>

**Lesson Notes:** This written reflection is the summative assessment for this module. I have found that students are less likely to take risks with their learning, when it can have a large impact in the percentage they see in the gradebook. In order to encourage my students to set ambitious goals and push their own understanding while adapting the MNIST code, I want to ensure that I do not include that task as part of the final assessment. Even if the point value has the same academic impact, the student perception is completely different. By making the summative assessment a written reflection, I am making it safe for my students to fail to meet their goals during the adaptation task. Students will be assessed on their ability to clearly communicate their understanding of how the network is learning to classify their images with an overview of the training and validation process, a description of the modifications they made to the provided MNIST code with a focus on iterative design, and a summary of the performance and next steps for the design of their system. Since so many pieces of this module are open to student design, I avoid using rubrics I have developed. Rather, I allow the students to refine my ideas for the rubric after they have made their project choices.

**Assessment:** This task will be assessed for thorough responses, clear communication, and timeliness.

## Lesson 6 of 6: Machine Learning and Artificial Intelligence Written Reflection

For this assignment, you will be writing a reflection to summarize the changes to your understanding throughout this module. At this point, you have

- Investigated existing applications of image classification programs that utilize neural networks
- Examined resources that explain how neural networks “learn”
- Explored existing code that classifies digits in the MNIST data set
- Developed your own MNIST data set
- Adapted the MNIST data set to meet a need of your choice

Your reflection should be written in a professional tone, with special care taken to adhere to standard grammar and spelling conventions. Be sure your reflection is detailed and thorough enough that I am not left with questions regarding your process or understanding, but that it is not redundant. This means that the length of your reflection may not compare with that of your peers.

It is in your best interest to have another student review your reflection before you submit it. If you need help choosing someone to partner with, let me know and I can help structure teams.

Your reflection should include responses to the following questions, but may be structured and sequenced how you prefer. You are not limited to these prompts.

- What is a neural network?
  - What is its purpose?
  - How does it work?
  - How is it currently being used?
- What adaptations did you make (or intend to make) to the existing MNIST model you were provided?
  - What worked well?
  - What did you have to troubleshoot?
  - How did you make these changes iteratively?
  - What would you continue to work on if you had more time?
- How does the MNIST model you examined connect with the image classification technology you saw with the Google AIY Kit and the applications you examined?
- What are the implications of this technology as it continues to become more readily available in our society?