Lesson Title	Machine Learning Video Tour
Sequence	**3 of 6**
Duration	● **2 - 45 minute classes to view videos and update chart**
Materials	● **Video links** ● **Post-it notes**
Objectives	**Students will expand their understanding of machine learning, neural networks, and artificial intelligence through a guided video tour. Students will document their learning process by completing a community Know-Want to Know- Learned chart.**
Standards	**Indiana** ● CSII-2.4 Analyze the work of peers and provide feedback ● CSII-6.1 Describe the function of a computing artifact ● CSII-6.2 Identify the purposes of a computing artifact **ITEEA** ● 10 Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. ● 11 Students will develop the abilities to apply the design process ● 13 Students will develop the abilities to assess the impact of products and systems. **CSTA** ● 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. (P7.2)

Lesson Notes:

This lesson is designed to introduce students to machine learning concepts and neural networks through a video series. The videos allow students the opportunity to play, pause, and restart as often as they like. Each video can also act as a launchpad for students to identify other areas they would like to research.

Throughout this lesson, students will be updating a classroom "KWL" chart. The premise of the KWL chart along with additional instructional strategies can be found here.

Before beginning this task, students will document the things they know and want to know on post-it notes. They will attach those post-it notes to the classroom KWL chart. As they watch the videos and discover new information, they will update the want to know and learned columns of the KWL chart. At the end of the lesson, we will debrief what they have learned as a class.

Assessment: This task will be assessed for on-task behavior, communication, and timeliness.

Part I: Know and Want to Know

Before you begin watching videos, take a moment to think about what you already know about machine learning, artificial intelligence, and neural networks. Use your investigations of the existing technology to fuel your thought process. *(It is okay if you have a much larger portion of unknown.)* Jot each item down on its own post-it note. Share your ideas with your neighbor and add your post-it notes to the "Know" column on the KWL chart on the wall.

Now, think about what you want to know about machine learning, artificial intelligence, and neural networks. Review the questions you documented during your investigations. Jot each item down on its own post-it note. Share your ideas with your neighbor and add your post-it notes to the "Want to Know" column on the KWL chart on the wall.

Part II: Video Tour

This series of videos will help you increase your understanding of neural networks. Take notes on the interesting information you find as you watch. This will help you make stronger connections later. At the conclusion of each video, update the KWL chart with things that you have learned and any new information you want to know. Share your discoveries with a neighbor as you work.

Video 1: But what *is* a Neural Network?

Video 2: Gradient Descent and How a Neural Network Learns

Video 3: What is backpropagation?

Optional: Here are some other videos you can watch. I liked them. It might be a good starting point to continue your exploration.

How Neural Networks Learn

Convolutional Neural Networks Explained

VIsualizing Convolutional Filters from a CNN