

Lesson 9: Saving Models in AI Lab

45 minutes

Overview

Students complete the full process of training and saving a model, then importing into App Lab. For the first time, students are able to choose the label they would like to predict and spend time deciding the features they will use to help predict their label of choice. Students also create a model card for their models in order to save them and import it into App Lab

Question of the Day: How can I use Model Cards to document my decisions when training a machine learning model?

Standards

Full Course Alignment

AI4K12 National Guidelines 2021

- ▶ **BI-3** - Computers can learn from data

CSTA K-12 Computer Science Standards (2017)

- ▶ **AP** - Algorithms & Programming
- ▶ **DA** - Data & Analysis

Agenda

Warm Up (5 minutes)

Journal

Activity (35 minutes)

Model Cards in AI Lab

Zoo Predictions

Importing Your Model

Wrap Up (5 minutes)

Journal

Objectives

Students will be able to:

- Create model cards in AI Lab to save machine learning models
- Use data visualizations and feature iteration to train machine learning models

Preparation

- Review the Code Studio levels before the lesson to be familiar with investigating columns in AI Lab and training their model
- Print copies of the activity guide for each student
- Check the "**Teacher's Lounge**" forum for verified teachers to find additional strategies or resources shared by fellow teachers

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **Saving Models in AI Lab** - Slides
- ▼ Make a Copy

For the students

- **Model Cards in AI Lab** - Video
 - **Selecting a Label** - Resource
 - **Zoo Models** - Activity Guide
- ▼ Make a Copy

Teaching Guide

Warm Up (5 minutes)

Journal

 **Prompt:** *People often post information about themselves on social media like:*

- *Their name and age*
- *The school they go to*
- *Where they live*
- *Movies they like*
- *Restaurants they've been to*
- *Their birthday*

If all of this data was collected, what is one thing you think a machine learning model could try and predict from this data?

Discussion Goal: Answer will vary, but could include local movie or restaurant recommendations, names of people with similar interests, how much money they spend, a birthday present they should buy. There is no single correct answer to this prompt - instead, focus on the choices that students are making about what features to emphasize and what they want to predict in the first place. Even with the same set of data, students may make dramatically different choices about what a model could look like with this data.

Remarks

This is a common situation in machine learning - people have a dataset that they've collected, and then they have to decide what they want to predict from the data. And there are a lot of decisions that go into training a model like this! Today, we'll see how you can use model cards to help keep track of all the decisions that go into training a machine learning model

 **Question of the Day:** How can I use Model Cards to document my decisions when training a machine learning model?

Activity (35 minutes)

Model Cards in AI Lab (5 minutes)

 **Video:** Show students the [Model Cards in AI Lab](#) video, which summarizes Model Cards that students saw yesterday and shows how they can be saved in AI Lab.

Teaching Tip

Black Boxes: This video references how AI models are sometimes referred to as "black boxes" and how difficult it can be to uncover how a model works once it's trained. Examples of this can be seen in the [ProPublica Breaking the Black Box](#) journalism series. This is a 4-part series that includes short videos and additional resources about different investigations into machine learning algorithms. One of the videos on pricing calls out how online products can have different prices depending on the zip code of the user, which is a common issue involving bias in machine learning models where a zip code can be used as a proxy for race or socio-economic status.

These videos aren't intended for classroom use, but you may decide to share some of these videos with students to continue conversations around bias in machine learning and the need for transparency via Model Cards.

To encourage active engagement and reflection, use one or more of the strategies discussed in the [Guide to Curriculum Videos](#).

 **Code Studio:** Have students log into Code Studio. The first three levels represent the zoo dataset in AI Lab where students can train a model.

 **Distribute:** Pass out the [Zoo Models](#) activity guide to each student.

 **Display:** Display the slide with the scenario for today's task, where we've been hired by a zoo to create different apps for customers to interact with around the zoo. Have students read the slide aloud.

Zoo Predictions (20 minutes)

 **Do This:** Have students complete the first three levels of Code Studio. Students will train and save 3 models using the Zoo dataset. They will also record some of their responses on the activity guide.



1-3

Zoo Predictions

1

2

3

Circulate: Check in with students as they train their models. Students should spend time iterating on the features they are selecting. The "Previous Results" section of the results screen can be helpful for students to find feature combinations that will work with their label. Students should also use the activity guide to practice filling in their model card.

Teaching Tip

Selecting a Label: This is the first time students can choose the label for their model. The process is identical to selecting features, but be aware that some students may be initially surprised by this extra step in the process. Students can access a resource in the Help and Tips section of Code Studio that explains how to select a label in AI Lab

Revisiting Past Screens: Let students know it's okay to go back and revisit past screens to improve their model or make different decisions - this is an important part of the process and something students should practice in this level. Students may find themselves starting to move fluently between the testing, feature, and label screens as they refine and improve their machine learning model.

Level 2 - Where Are The Tables? In level 2, students predict the type of animal that they are looking at (like mammal, reptile, etc). This column has too many possible values, and so many data visualization tables won't appear. This is intentional, since it challenges students to use feature iteration and the Previous Results screens intentionally to find features that work. They need to trust that, if there are patterns in the data, AI Bot will find them and produce an accurate model even when there's too much data to visualize. This also prepares students for more realistic examples where there are typically more than 4 or 5 values for a feature.

Accuracy and Data Representation: Students may be able to discover some curious combinations that give 100% accuracy. This may be because the particular features they chose are not well represented in the dataset - for example, only 8 out of the 100 animals are considered Venomous. This could lead to inflated accuracy, especially if those animals are not well represented in the testing set. If you notice students training models like

this, ask them to thoroughly test their models and compare the results to their real-world experiences to make sure the model matches reality. Remind them that just because a model has high accuracy on its testing data doesn't mean it will have high accuracy in the real world.

Importing Your Model (10 minutes)

 **Code Studio:** Have students continue to the next level. This is an App Lab level where students can import their trained model and begin customizing their app.

Circulate: Help students import their app and verify that the model works correctly before continuing to level 3. Students should use the remaining time to customize their app, reinforcing the skills they learned in the last lesson on how to make their app more user friendly.

Teaching Tip

Focus on AI Lab, not App Lab: Even though students may be excited about using their models in App Lab, the larger goal of this lesson is to practice training accurate models in AI Lab and using Model Cards to document those decisions. These final levels are provided to complete the full cycle of importing a trained model to App Lab, but students are not expected to complete a fully-designed app in the time they have. Instead, tomorrow's lesson focuses entirely on App Lab which is where students can create an app more fully.



4

Importing Your Model



Assessment Opportunity

Formative Assessment: This level can be used as a formative assessment.



Assessment Opportunity

Formative Assessment: This level can be used as a formative assessment. A rubric is provided in the level, and written feedback can be given to students. [Click here to learn more about giving feedback to students.](#)



5

Customizing Your App

Wrap Up (5 minutes)

Journal

 **Reflection:** *Why is a model card useful when creating a model in AI Lab? How is a model card useful when creating an app in App Lab?*

Students can answer this on their activity guide or as an exit ticket.

Discussion Goal: Students may relay similar points as the opening video - that a model card helps document decisions and provide transparency, and it can be used in App Lab to help add to the design - but their responses should be more grounded in their experiences in this lesson, especially after selecting their own label and training their own model.



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