BABEŞ BOLYAI UNIVERSITY, CLUJ NAPOCA, ROMÂNIA
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Pedestrian Detection

– ITSG report –

Team members
Balas Tudor-Dan, Software engineering, 258

2020

- Main features

The smartphone will see the traffic ahead through its camera, and then show the driver some extra information that could help him in different situations.
It must recognize pedestrians.
Depending on the user's location, car and speed, the application will show different warnings or alerts, depending on the danger level of the obstacle.

- What does the AI do in this case?

- The AI will learn to differentiate different objects in the space, and also predict behaviors that could put in danger the life of the driver, or the people around

- Related work & useful tools

  Apple's Core ML: https://developer.apple.com/documentation/coreml
  ObjectDetection: https://github.com/tucan9389/ObjectDetection-CoreML
  Training Object Detection Models in Create ML:
  https://developer.apple.com/videos/play/wwdc2019/424/
  Pedestrians: http://www.pedestrian-detection.com
  Routing: http://neo.lcc.uma.es/vrp/vehicle-routing-problem/

- How it works?

Apple released 2 powerful tools for creating and using ML model:

- CreateML can be used on MacOS (Desktop & Laptops); with CreateML we can create and train custom machine learning models. Also we can use it for improving model's accuracy, by alternating the date we have.

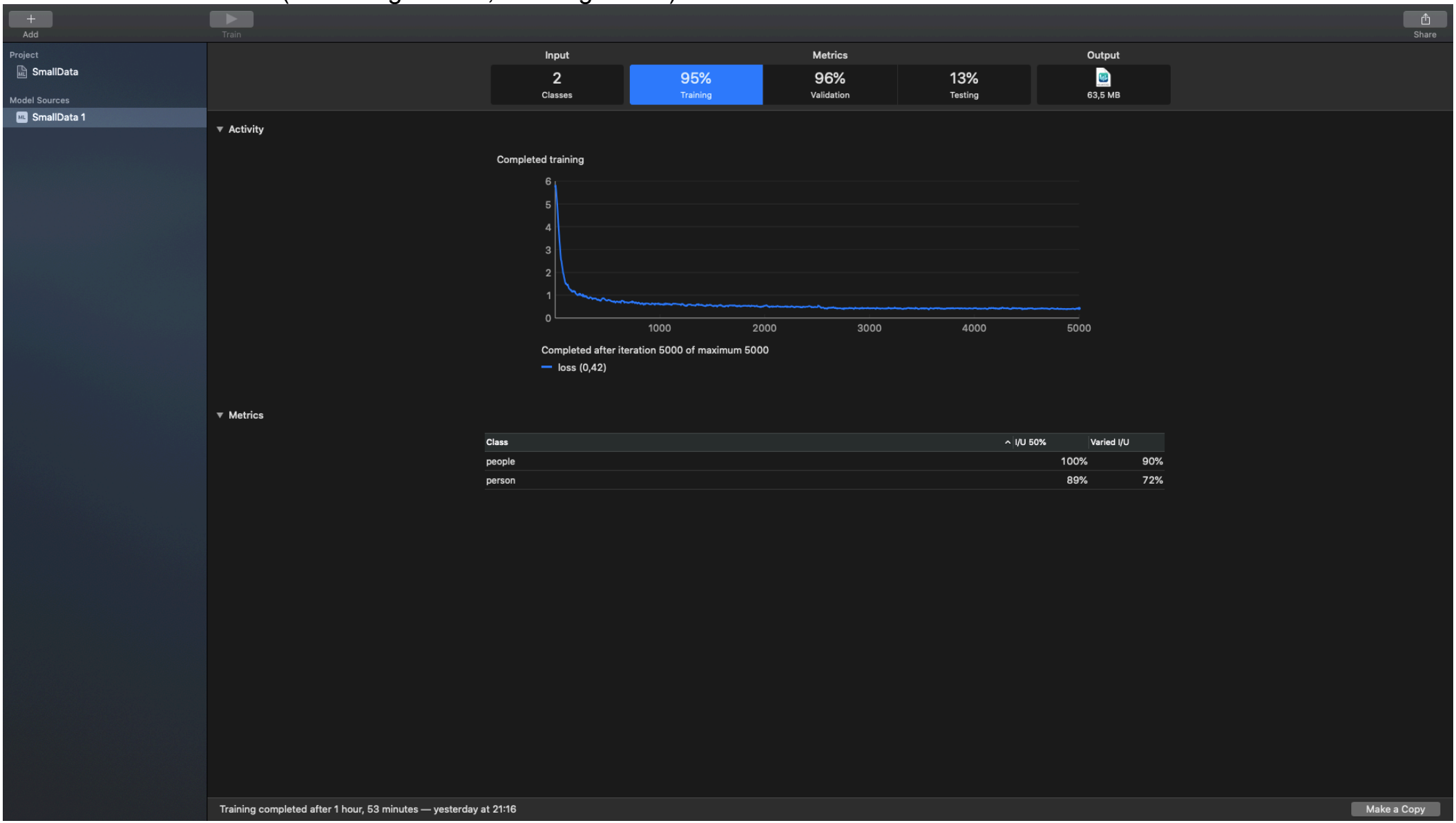
- CoreML can be used on mobile platforms too (both iPhones and Apple Watches); with CoreML we can integrate previously created machine learning models into our apps. If we really want, we can improve model's performance on device, but that usually takes a lot of time due to hardware constraints.

For this project we will use Object Detector feature to find the objects inside our image.

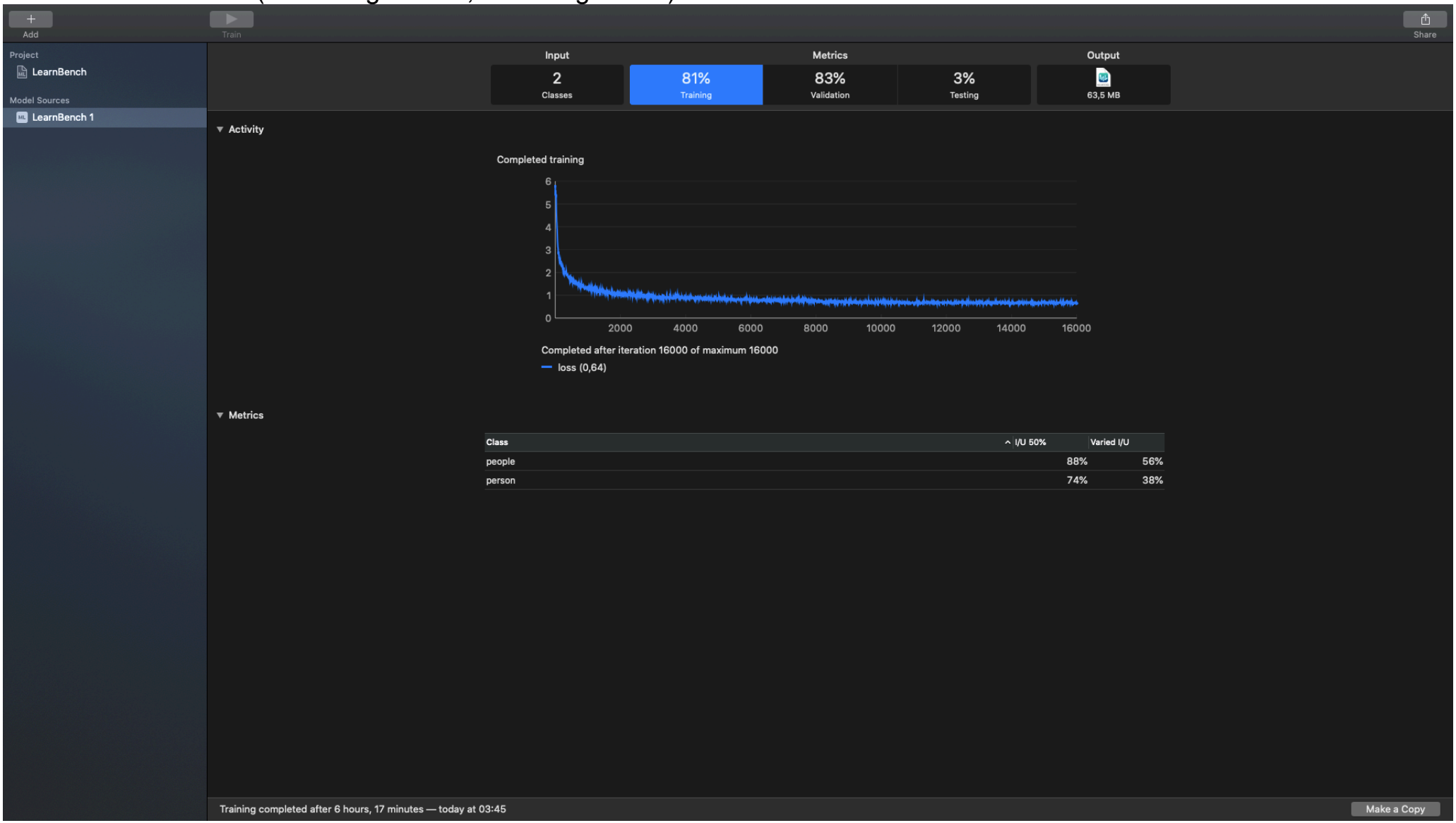
At this point in time, Apple doesn't offer any details on how the Object Detector works behind the scenes. The documentation doesn't offer many details regarding the customization or any low-level details regarding the implementation. This might change over the course of time, as it was release less than 3 years ago.

Docs:
https://developer.apple.com/documentation/createml
https://developer.apple.com/documentation/coreml
https://apple.github.io/coremltools/coremlspecification/index.html

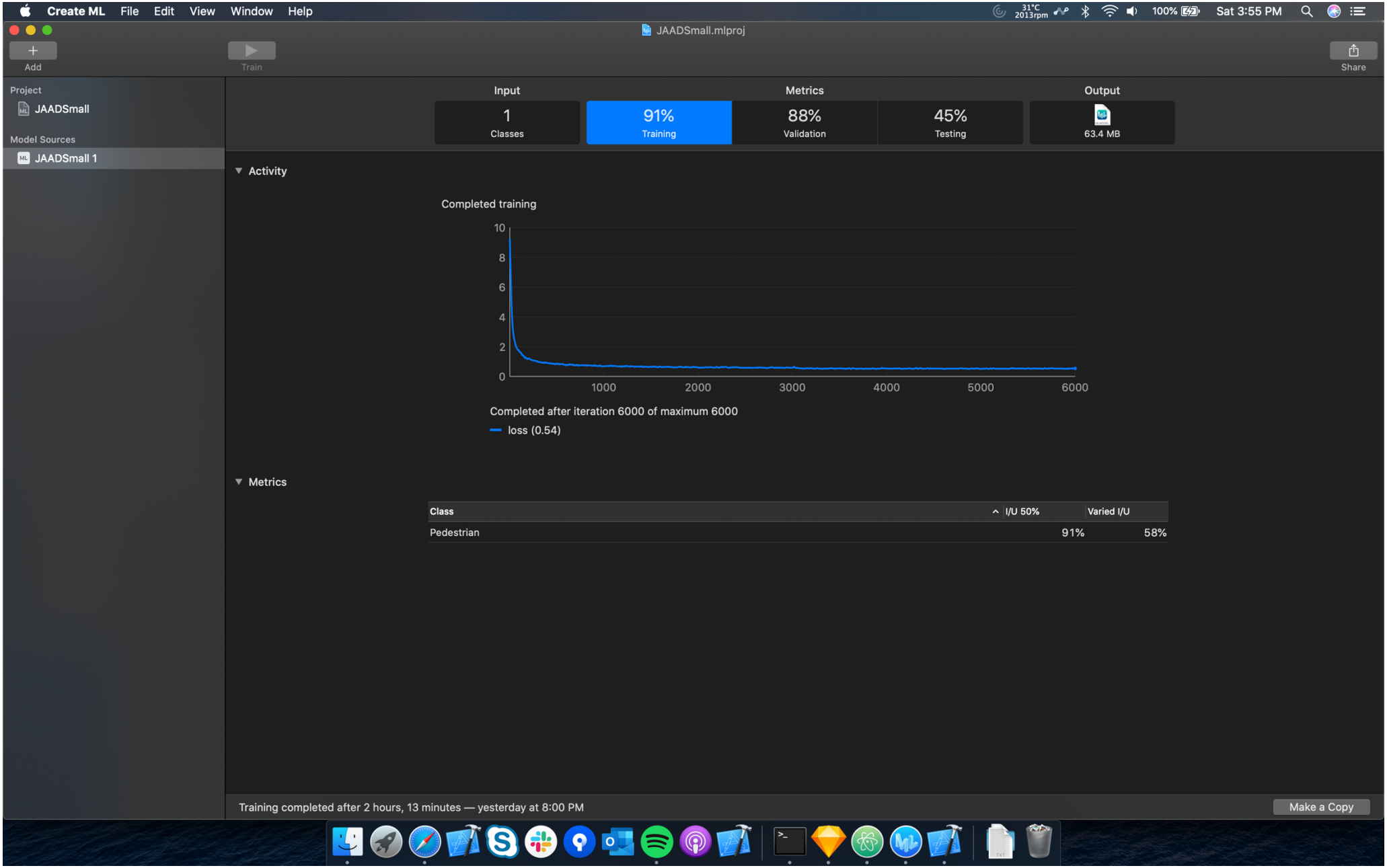
Small data – Caltech (101 images train, 80 images test)



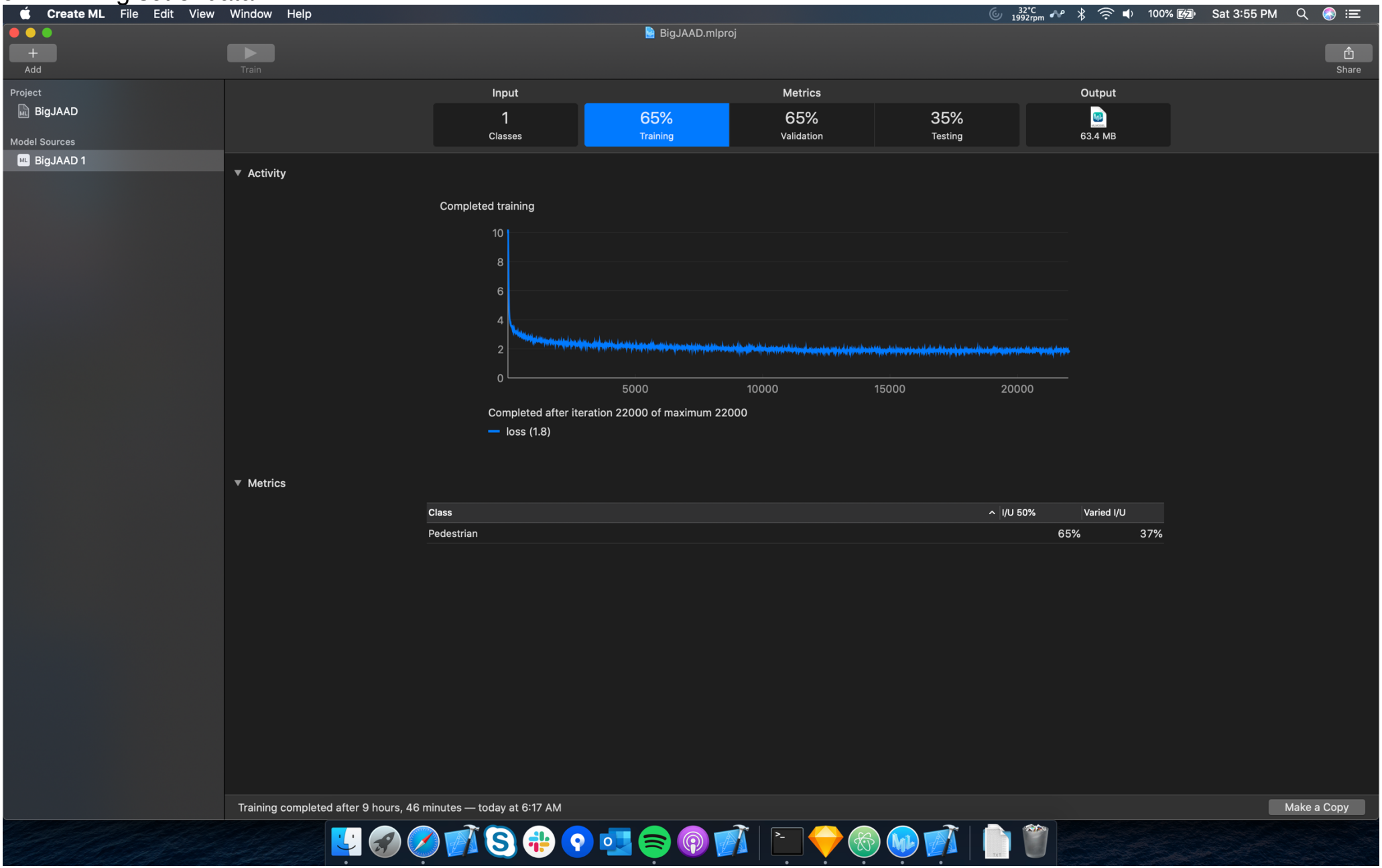
Real bench - Caltech (989 images train, 510 images test)



JAAD – Small set of data



JAAD – Big set of data



- Results

	CALTECH		**JAAD**	
Data Set Size	Small	Big	Small	Big
Training	95%	81%	91%	65%
Validation	96%	83%	88%	65%
Testing	13%	3%	45%	35%

- Conclusions

At this point in time, CreateML is way too new to be used and give good results.
In all the testing done, the matching results were below 50%.