AI Bootcamp

Multiclass Image Classification With CNNs

Module 19 Day 3

Class Objectives

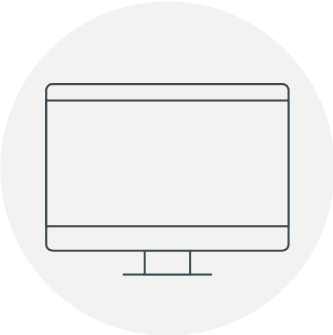
By the end of class, you will be able to:

1. Understand branching in neural networks.
2. Apply branching to basic neural networks.
3. Understand the implications of softmax as an output activation function.
4. Apply softmax to a basic neural network.
5. Apply branching and softmax to a CNN for image classification.

Instructor **Demonstration**

Multiclass and Branching

Real-World Classification

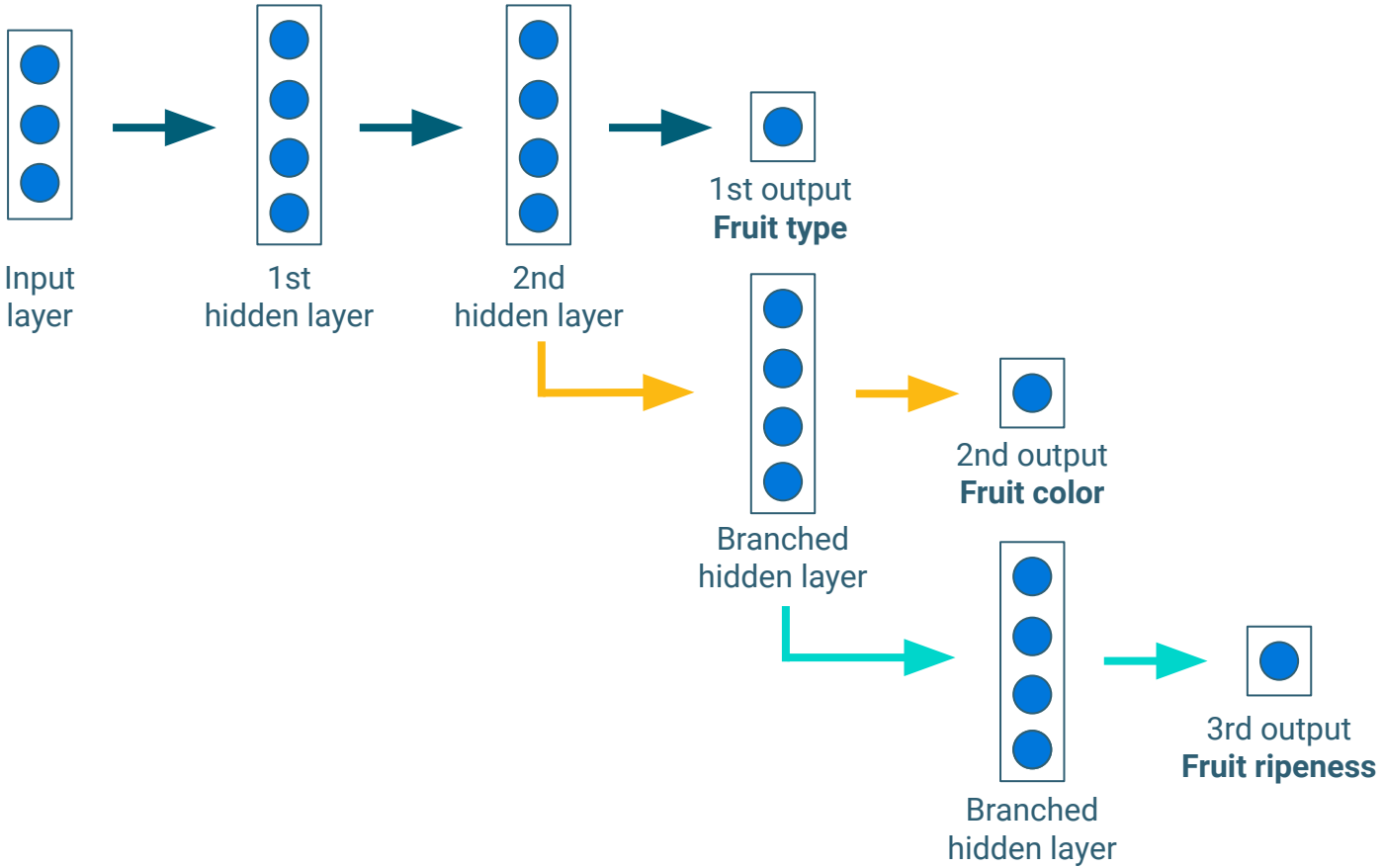


- Entertainment
- Business

- Irreverent
- Quirky
- Witty

- Black
- Trail
- Running
- Shoes

Branched Network



Activity:

Softmax vs. Sigmoid

In this activity, we will consider three scenarios and determine whether softmax or sigmoid is the best activation function choice.

Suggested Time:
10 Minutes

Activity: Softmax vs. Sigmoid

01

Scenario 1

A CNN is created to predict whether an image has one vegetable or multiple vegetables and whether the vegetables are green or red. These labels are in 4 columns: `one_vegetable`, `multiple_vegetables`, `red`, and `green`.
If these columns are predicted using a single layer, which activation function would be best suited?

Click for answer

Activity: Softmax vs. Sigmoid

02

Scenario 2

A neural network is created to evaluate whether an item online will sell more, fewer, or the same number of units next month.

Each potential outcome has its own column.

Click for answer

Activity: Softmax vs. Sigmoid

03

Scenario 3

A neural network is designed to predict which group a flower belongs to: Species A, Species B, Species C, or Large petal variant (any species).

If these four columns are predicted using one layer, which activation function is best?

Click for answer

Questions?

Activity:

Branching

In this activity, you will use Keras to build a non-sequential model with multiple branched outputs.

Suggested Time:

20 Minutes

Questions?

Break

15 mins

Activity:

Preparing Faces for Branching

In this activity, we will prepare the face images data for branched predictions on multiple columns.

Suggested Time:
30 Minutes

Questions?

Challenges of Image Data

1. Noisy images
2. Variation
   - Intra-class variation
   - Scale variation
3. Computational expense

Activity:

Branching Faces

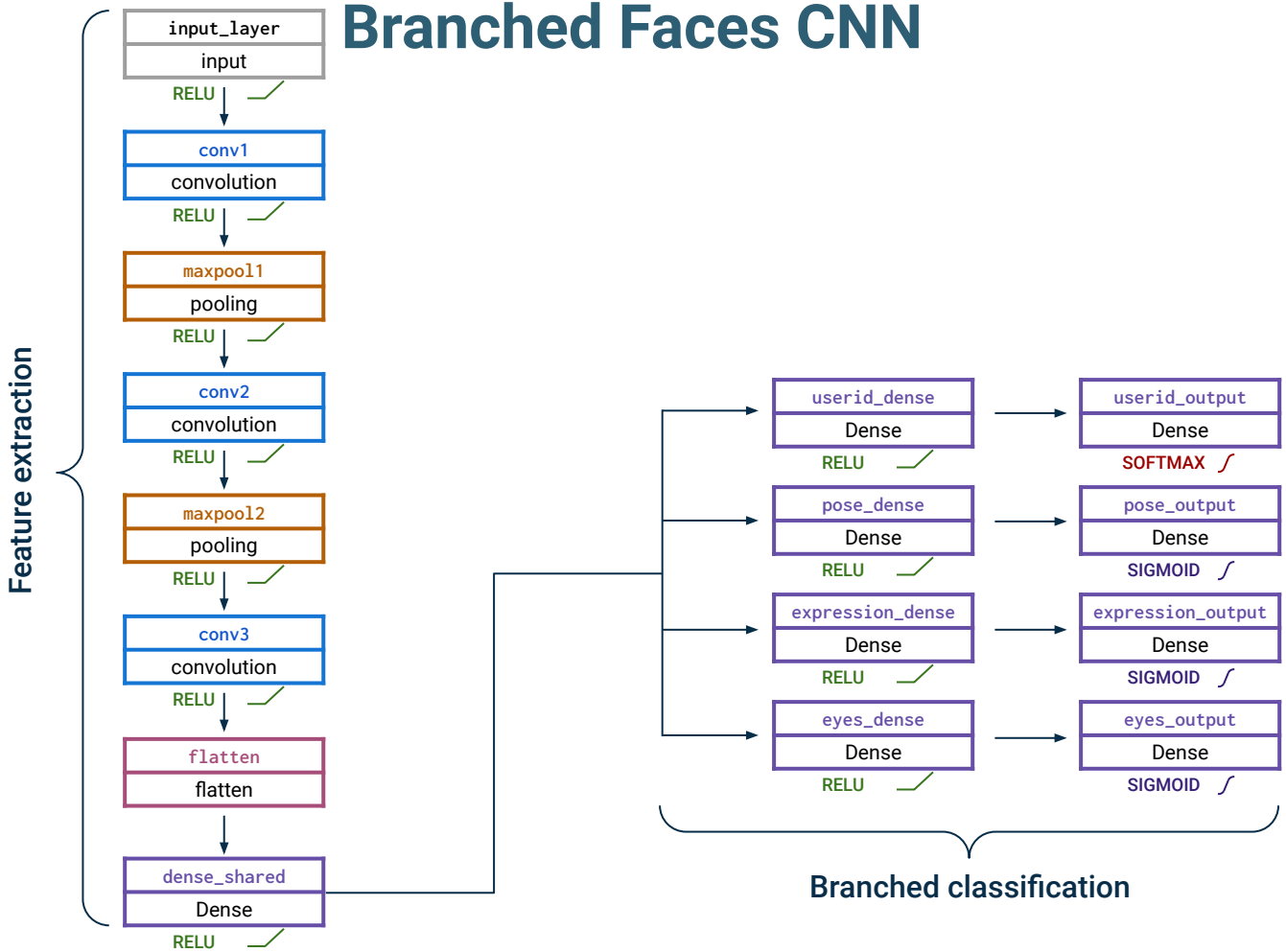
In this activity, you will use Keras to build a model to predict all the classes in the faces dataset.

Suggested Time:
25 Minutes

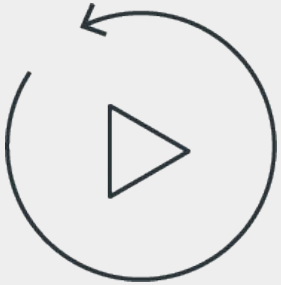
Time’s up!

Let’s review

Branched Faces CNN



Questions?

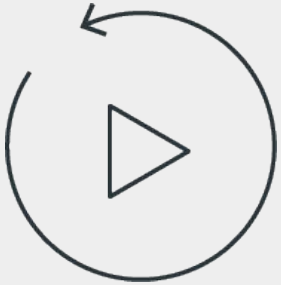


Module **Review**

Module Review

In this module, we covered the following key concepts:

1. Understanding image representations and multidimensional arrays
2. Converting images to numbers
3. Importing, pickling, and unpickling image data
4. Preprocessing `X` and `y` data for image classification models
5. Understanding convolution and CNNs
6. Augmenting images to increase the size of training data
7. Evaluating softmax and sigmoid as activation functions
8. Coding a simple CNN for single classification
9. Coding a branched CNN for multiclassification



Let’s **recap**

Recap

After today's lesson, you are able to:

1. Understand branching in neural networks.
2. Apply branching to basic neural networks.
3. Understand the implications of softmax as an output activation function.
4. Apply softmax to a basic neural network.
5. Apply branching and softmax to a CNN for image classification.

Questions?

The End