

## Problem 1

- This causes the expected count to stay below the observed for both 'circle' but increase above observed for 'triangle', until about  $\sim 1.11$  which then reverses the roles of the expected count.
- The red bar shows a decrease in the expected count and blue bar represents an increase in the expected count.
- When solve is selected

Log-Likelihood Scores  
Current LL: -71.932

Data & Model Options

**Change the data**

New random challenge  
New counts





**Regularization**

☒ None  
☐  $l_1$   
☐  $l_2$

Hints

☒ Show gradient  
Step size = 0.1000  
4 iterations done  
Step Solve

Type Counts: Observed and Expected

30	30	15	15
			
10	10	5	5
			

$N = 60$

Feature Weights

circle: 0.5493  
solid: 0.342  
triangle: -0.5493  
striped: -0.342

Zero weights

- When regularization  $l_1$  is selected.

Log-Likelihood Scores  
Current LL: -5.194

Data & Model Options

**Change the data**

New random challenge  
New counts





**Regularization**

☐ None  
☒  $l_1$   
☐  $l_2$   
C = 2

Hints

☒ Show gradient  
Step size = 0.1000  
5 iterations done  
Step Solve

Type Counts: Observed and Expected

30	27	15	16
			
10	11	5	6
			

$N = 60$

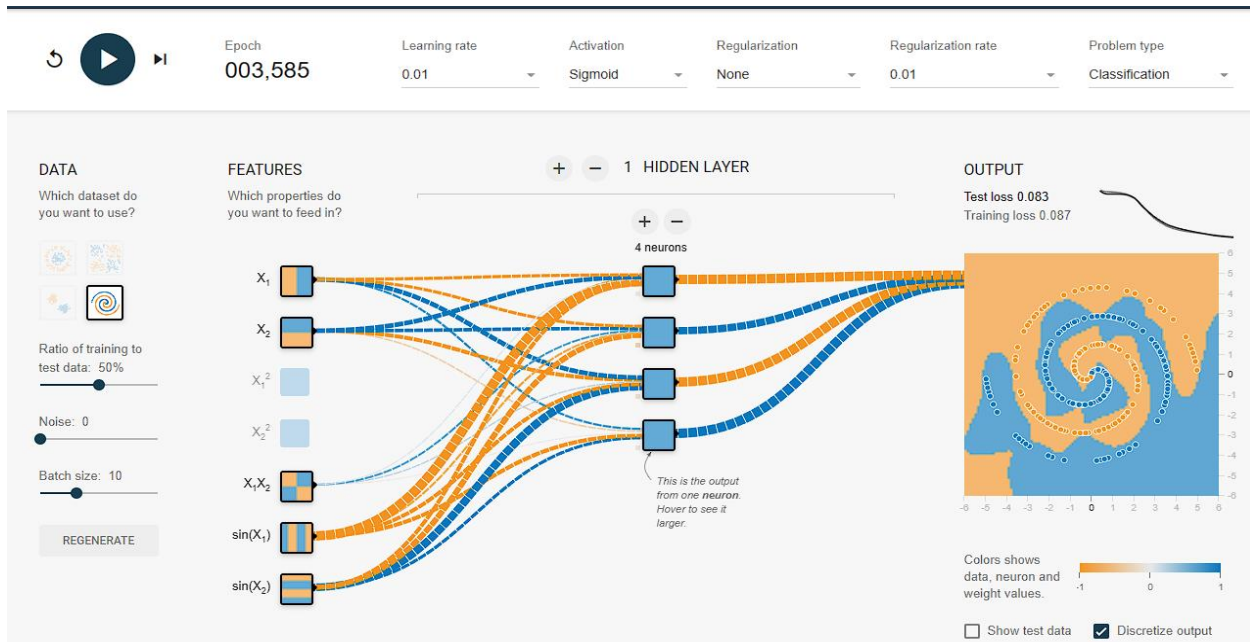
Feature Weights

circle: 0.4642  
solid: 0.276  
triangle: -0.4642  
striped: -0.276

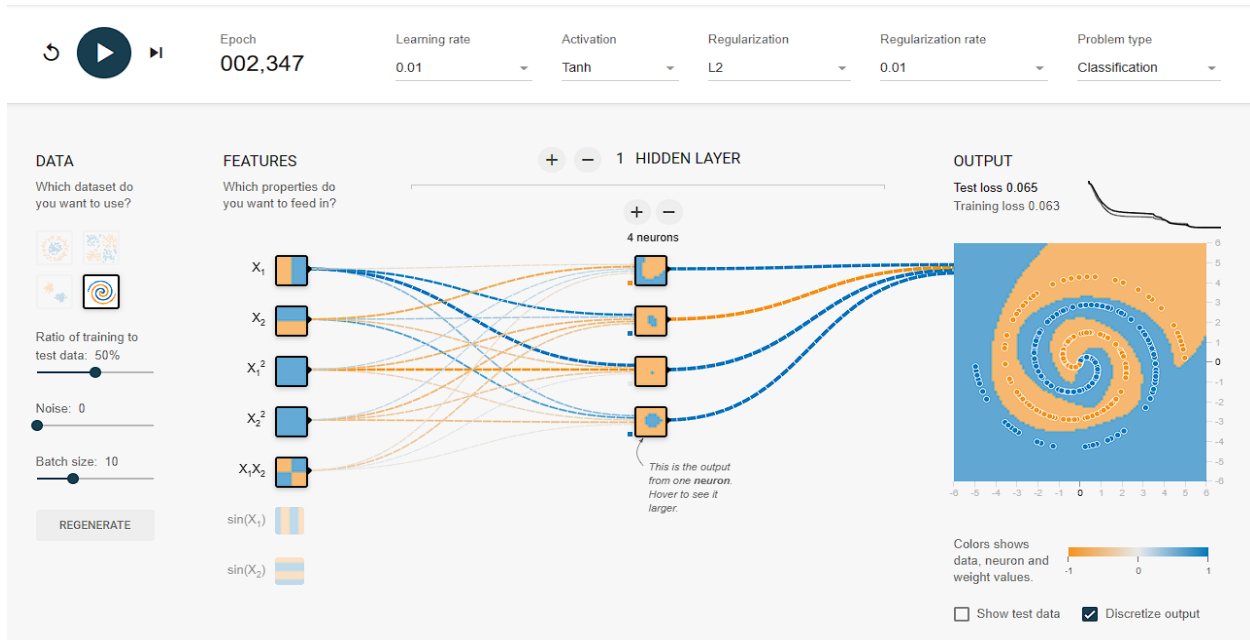
Zero weights

- E. This is due the regularization of the model which helps reduce the over and underfitting of the previous result.
- F. Z ensures that the value we calculate does not exceed 1 meaning, allowing our result to be bounded between 0 and 1.

## Problem 2



➔ Adding regularization should both lower the number of epochs and training/test loss



## Problem 3

- A. Kernel Size: 3x3  
Stride length: 1  
Maxpool window size: 2x2
- B. This CNN only has two animals to compare against and so it seems fair to assume it would try to find a features that are similar. Thus, I believe this says that class 'Espresso' contains features that closely resemble those of the features identified in the 'Coyote' and 'Rattlesnake' classes.