

Convolutional Neural Network: -Rocket League Image Classification- Substitution Decision Making

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**ROCKET
LEAGUE**

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- ▶ How can a coach use this?
- ▶ Further explorations



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- ▶ [Rocket League Montage](#)



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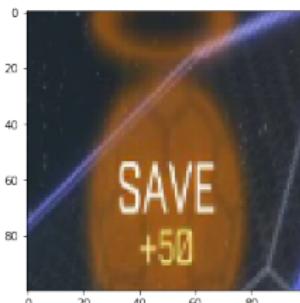
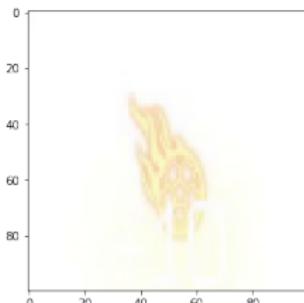


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- ▶ What solution am I attempting to bring?
 1. The game lacks the tools to grade your session. It will only give you limited statistics on how you did in one game or how you did in your entire lifetime of play.
 2. Like in professional sports, with substitutions, it can be viable for an application to actively determine if a player is performing. If they are not, then the application can recommend a player based on statistics of the player's current state.



Image Classification



- ▶ Using CNN and a pre-trained model Imagenet, we classify images such as the ones we see here.
- ▶ Video were image sequenced (cut into images) to be fed into the model to learn.
- ▶ There were over 20 classes for the model to be trained on with over 1000 images I manually selected for it to learn from.



Image Classification (Continued)

- ▶ As seen in the previous slide, the images were resized and cropped into such a shape. In fact the original picture was something like this:



▶ The pattern that occurs is that the notification of a class is always in the same spot which makes it easier for the model to learn if we resize and crop the image before processing.

Accuracy of Model

- ▶ Using a train test split, I determined the accuracy of the model and like many other machine learning models, CNN are also prone to over-fitting. So I used the cross-entropy loss function to gauge when the model should stop training and take it as the best model.
- ▶ Once we create the best model possible from the training set, we then evaluate the images to see the results by comparing its predicted results vs the actual results.

Accuracy:	
Train	88%
Predicted	76%
Actual	70%



Comparison

Predicted Results:

Aerial Goals	Assists	Backwards Goals	Bicycle Goals	Center Balls	Clear Balls	Demolitions	Epic Saves	Exterminations	First Touches	Goals	Hat Tricks	Long Goals	Low Fives	MVPs	Overtime Goals	
0	0.0	1.0	0.0	0.0	2.0	2.0	1.0	0.0	0.0	35.0	7.0	0.0	1.0	0.0	1.0	0.0

True Results:

Aerial Goals	Assists	Backwards Goals	Bicycle Goals	Center Balls	Clear Balls	Demolitions	Epic Saves	Exterminations	First Touches	Goals	Hat Tricks	Long Goals	Low Fives	MVPs	Overtime Goals
0	0	0	0	0	2	2	0	0	0	1	2	0	0	0	0



Decision Making

- ▶ Assuming that my image classification was near perfect, we now can evaluate a player's performance by comparing their average performance vs the performance in one game.
- ▶ I used 30 videos to create a profile of the player that the computer predicted on and then compared their results in their last game.
- ▶ I reduced the columns to the ones that I thought mattered the most:
First Touches, Assists, Goals, Saves, MVPs, Demolitions, Center Balls, Epic Saves, Shots on Goal and Clear Balls



Output

- ▶ It lets you know the following:
 - a. Player is playing above average.
 - b. Player is playing averagely.
 - c. Player is playing below average. Substitute player.
- ▶ Based on z-score and 2 standard deviations to evaluate performance.
- ▶ **Results:** Average Z-score: -0.059874305081762766
Player is playing their average level.

	Assists	Center Balls	Clear Balls	Demolitions	Epic Saves	Exterminations	First Touches	Goals	MVPs	Saves	Shots on Goal
0	0.0	4.0	6.0	3.0	2.0	0.0	1.0	1.0	1.0	4.0	2.0
1	1.0	7.0	4.0	1.0	0.0	0.0	5.0	3.0	1.0	4.0	4.0
2	3.0	3.0	5.0	3.0	0.0	0.0	6.0	4.0	1.0	2.0	2.0
3	1.0	5.0	3.0	4.0	1.0	0.0	2.0	1.0	1.0	5.0	2.0
4	2.0	6.0	5.0	4.0	1.0	0.0	11.0	2.0	0.0	3.0	3.0
5	0.0	5.0	7.0	2.0	0.0	0.0	2.0	2.0	1.0	2.0	4.0
	Assists	Center Balls	Clear Balls	Demolitions	Epic Saves	Exterminations	First Touches	Goals	MVPs	Saves	Shots on Goal
0	0.0	4.0	3.0	3.0	0.0	0.0	2.0	2.0	2.0	1.0	3.0



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- ▶ I assumed equal weights for each class due to time constraints which is not the best. Scoring a lot weighs more than say a first touch.
- ▶ This problem is solvable if I could break into the game's code and have collected the results every time a class object is shown on screen. I could even do it to where I could do it for any player which is an improvement on my code and does not require deep learning. This could be ToS. This would be unknown to me.



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- ▶ MORE PICTURES!



DONE!
AWAITING CRITICISM...

