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Artificial Intelligence - Computer Vision

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<center>Chihuahua or Muffin Workshop – Reflection</center>

In this week's lab experience, I was tasked to explore image classification using machine learning techniques. The images we were classifying fell into one of two groups, chihuahuas or muffins. I found the topic hilarious as I remembered seeing images of both things looking awfully similar. I never thought I would have an assignment based around it. This topic is an excellent way to demonstrate how a computer can view an image and classify it and how accurate it can be. I was excited to jump in.

As stated before, the dataset we are using for this week's assignment is The Chihuahua vs Muffin dataset. This dataset consisted of 150 images divided between the two classes. We used this dataset to train and evaluate our Neural Network, which is a machine model inspired by the anatomy of the brain. It has interconnected layers of nodes or neurons that process and learn from data to perform classification or regression tasks. The neural network would attempt to classify an image whether it is a chihuahua or a muffin. Before the neural network model can classify images, a series of code was written to process it, convert it into a format that the model can understand. On top of that, the dataset containing the images needed to be split into 2 halves serving different purposes (training and testing).

I loved how structured this assignment was. In the .pynb file, not only were the codes used to create the neural network and set up our data clearly presented, but there were also notes and explanations sprinkled throughout. These annotations helped separate the lines of code, with each segment serving a specific purpose and providing further detail. I found this approach extremely useful as I took notes on the material. One aspect that stood out to me was defining the structure of the neural network. In that segment of code, I gained insights into the number of layers we were using, the height and width of the images, and the number of epochs for training. This clarity made it easier to grasp the overall architecture and functionality of the neural network.

To me, this assignment went hand in hand with the group assignment we had this week. Both were centered around neural networks, reinforcing my understanding of their operation. This assignment helped me grasp the coding aspect of neural networks, allowing me to observe how input data is inserted, processed and the resulting output. Additionally, working through these concepts has deepened my appreciation for the complexities of neural networks and their potential applications in real-world scenarios. I feel more confident in my ability to implement and analyze neural network models moving forward.

Exploring the Muffin vs. Chihuahua dataset was an enlightening experience that sparked a mix of excitement and curiosity. As I delved into the data, I felt a sense of wonder at how machine learning could distinguish between such seemingly simple categories. The journey through the several steps of coding to develop the neural network was both challenging and rewarding. From data preprocessing and normalization to building the model architecture and defining the training process, each step required careful consideration and adjustment. I eagerly awaited the results after each iteration, excited to see how the outcome would be! The focus of this assignment was to see how the neural network operates so I did not experience the challenges of fine-tuning hyperparameters and implementing techniques like dropout.

Towards the end of the file, the assignment encourages you to tweak the inputs and settings of the neural network to improve the performance of the model. I enjoyed this part because it gave me the chance to see how changing the inputs affects the results of the predictions. I learned in our group assignment, A06, that the output can depend on certain components of a neural network model, such as learning rates, activation functions, noise levels, neurons, and hidden layers. I tried a combination of changing the input size, hidden layers, number of epochs and the learning rate to see how different the results would be. Unfortunately, the results I came across weren't that far from the first time I ran the code. The model's prediction was roughly split 50/50 on calling an image a chihuahua or a muffin.

In conclusion, this assignment provided me with a comprehensive understanding of neural networks, enhancing my ability to classify images through a structured approach. I felt a sense of accomplishment as I navigated the intricacies of coding and gained insights into how neural networks operate. The detailed notes and explanations in the .pynb file made the learning process engaging and rewarding. Overall, I am excited about the knowledge I've gained and the potential to apply these concepts to more complex datasets in the future. Looking ahead, I am inspired to deepen my understanding of neural networks and continue experimenting with machine learning techniques, eager to uncover their capabilities in various applications.

References

Heo, M. (2018, May 27). What is tensor in deep learning? YouTube.
        https://youtu.be/tIqoI4jGEw?si=yneMkTnym95kZpm0

IBM Technology. (2022, May 24). Neural networks explained in 5 minutes. YouTube.
        https://youtu.be/jmmW0F0biz0?si=3_l-Oegojiomyzdj

Patitimoner. (2019, April 24). workshop-chihuahua-vs-muffin. GitHub.
        https://github.com/patitimoner/workshop-chihuahua-vs-muffin