Ethical Consideration Worksheet

It is of the utmost importance to always think about ethical considerations within the context of the systems you are building. Before starting any machine learning and AI project, it is important to frame the project within these guiding principles. In the following worksheet you will be asked to think deeply about your model and how it impacts and interacts with the world or how it could impact or interact with the world.

Social Benefit

Write a narrative about who would benefit from your project. Will some person or group likely be positively impacted?

* Our project would be a benefit to any medical patient who is required to receive an MRI. Young children and older adults are more likely to be diagnosed with brain tumors, but patients of all ages are able to develop a brain tumor. Patients would gain the most benefit from our project, as the machine learning model could help doctors quickly diagnose a brain tumor. As medical staff and patients receive quicker results, further necessary actions can be determined.

Bias

Bias can be found in many data sources and systems. Think about the inputs of your model. Is there any bias that might be codified or even amplified? Is your system capable of reducing that bias? Describe what bias might be present and how you would modify the dataset, model, or actions upon the model output to mitigate the bias.

* There can be many different sources of biased in out machine learning model. In our project, the only source of data came from images of MRI scans, so our model could only detect brain tumors from images. Our data was collected from a Kaggle dataset that only included images. Utilizing this dataset included many sources of bias. Our group was unable to take into considerations other factors that could have an impact on brain tumor detection. Data like age of patient, gender of patient, patient history of brain tumors, etc. Without this data, out group was only able to detect brain tumor through images of MRI scans, meaning that our system is not capable of reducing this bias. Another type of bias that we encountered was the amount of data. The Kaggle dataset where we collected our data from only contained 255 images of MRI scans. This number of images was insufficient to build and train a convolutional neural network model. In order to reduce this bias, we preformed data augmentation on all of the images from the dataset. Each image was flipped, mirrored, and rotated creating over 100o images in order to create more data to accurately create and train our model.

Safety

Think about how your model might be used. Are there any safety concerns? If you are building a model for something like a self-driving vehicle, the safety concerns are relatively obvious. However, even models in more low-risk domains might cause harm in some situations. How might your model cause harm? How might you reduce that risk of harm?

* For our project, the targeted group were medical patients receiving MRI scans for possible brain tumors. There of course will be some safety concerns about our model. If our model correctly detects a brain tumor in an image, then the patients and medical staff can receive results quicker and take necessary actions, reducing the time for professionals to review the MRI scans and utilizing time more efficiently. On the other hand, if our model does not detect a brain tumor when the medical patient actually does have a brain tumor could leave to negative effects. As the brain tumor goes undetected and untreated, the tumor could continue to grow and press the brain against the skull causing serious damage to the brain and ability to function. In the United States, for legal liability issues, a machine learning model is unable to detect and diagnose a patient with a brain tumor, as only a trained professional has the ability to. For this reason, out model was built as only aid to attempt to be efficient and accelerate the process of detecting brain tumors.

Accountability

If someone questions the output of your model, how might you explain to them how the specific outcome was reached? If problems are identified with your model, how might you adjust your inputs, model, or actions to account for issues?

* In this project, our group utilized the convolutional neural network model to achieve our goal of detecting brain tumors in MRI scans. Convolutional neural network, also known as CNN, is an artificial neural network primarily used to analyze images. CNN is an artificial neural network that specializes being able to pick out and detect patterns in images. Our group created our CNN model and applied the neural network into our data set of MRI scans for the model to determine if images had a brain tumor or did not have a brain tumor. Going through every picture in our dataset, the model concluded and detected the pattern of brain tumor by spotting the white fille circles in the images. If there would be a problem with our model, our group might adjust the model by being strict on which images go through the model to determine the pattern. With better data our group feeds into the model, the better results will be achieved.

Privacy

User privacy and consent are very important. Users should have an understanding of how their data will be used and maintained. Is your model using any potentially sensitive data? Is there a chance that sensitive information about a user might be exposed in some way? Is the data you are using data users would expect to be shared or would have explicitly shared?

* Since our data from Kaggle did not include any type of personal data other than images with no information, the model is not sensitive to any data. There is no chance or possibility that users’ data could be exposed in any way. For our project, there was no personal data that was collected or used for our machine learning model. The images utilized have no way to be traced back or be exposed at the patient’s expense.

Quality

Just because a model makes predictions doesn't mean those predictions are valid. Think about the inputs to your model and the intended usage. Can your model actually generalize well to the domain to which it will be applied? Do you have a plan to properly test and validate the model? Are you using proven techniques for your model and pipeline? Discuss how your model will adhere to solid scientific standards and quality controls.

* After creating and training our model, our group believes that the model achieves its intended usage. The model generalizes well to the domain to which our project was applied for. For testing and validating our model, we used proven techniques like precision, accuracy, f1-score, and a confusion matrix to portray our model.

Principled

Every organization and individual have a unique moral compass. Does this model fit into your and your organization's mission? What objections might you expect to see from someone with a different perspective? How might you explain your reasoning?

* I believe this model fit in perfectly with our groups mission. In a world where machine leaning algorithms and data could be used for profits at the expense of regular people, our group attained to use machine learning as a way to help people in everyday life. With our model that helps medical staff quickly detect and recognize brain tumors in MRI scans exactly aligns with our mission. One could possibly argue that if our model happens to fail could cause more harm than help. For this reason, our model was built as only aid medical staff to attempt to be efficient and accelerate the process of detecting brain tumors using a machine learning model. Trained professional medical personnel would still be necessary to make the final decision for the safety of the patient.