Project One

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CS370: Current/Emerging Trends in Computer Science

Neural Networks and How They Work

Neural Networks were first proposed in 1944 by Warren McCullough and Walter Pitts. Computational limitation of the time halted progress on neural networks. Perceptrons, which are single-layer networks which solved issues that are solved linearly separately, defined the development of neural networks in the 1960s-1970s. In the 1980s multi-layer network training was finally made possible with the invention of the backpropagation method. It had an emphasis on learning through interconnected nodes. This method gained a lot of appeal due to the connectionism. Neural networks saw a boom in the 1990s with applications in image identification, finance, and other fields. Research in neural networks was in a rough patch due to increased computational costs and the inflation in expectations. Larger datasets, enhanced processing, and innovative structures caused a resurgence in neural networks in the 2000s. Deep learning, a neural network method has shown itself to be effective in several different fiends by utilizing multiple layers of nodes. Deep learning has been dominating neural networks as of today. Convolutional neural networks and recurrent neural networks are two deep learning architectures that are dominating machine learning (Geeksforgeeks, 2019).

Neural networks work by extracting identifying features from data. The neural networks lack pre-programmed understanding at first. The network makes connections between neurons, which receive inputs determined by thresholds and activation functions. The connections use weights and biases which regulate information transfer. Neural networks take in data inputs which are then multiplied by adjusting weights. Once the inputs are adjusted in the input layer they are then passed through hidden layers. The network, through training, then learns to notice patterns indicating the wanted output or classification of data. These results are stored in the output layer. The output layer then gets its weight adjusted through backpropagation (Geeksforgeeks, 2019).

# Personalization

Deep learning and Neural Networks can be used to create personalization for each individual user. An example of this is how search engines and other online platforms hare able to understand the user’s interests based on their internet history and personalize ads and their experience (“How Deep Learning Works and How It’s Used to Create Personalised Recommendations,” 2023). Ethical concerns may arise due to this attempt at personalization. If an equal amount of data from different races of people are not put into the network, biases may arise and cause the application to create wrong/unhelpful results. If the creators of the neural network take data without the user’s consent, the user may feel that their privacy was compromised. If the model used for the neural network is not transparent or explainable, there can be ethical concerns, especially when it comes to neural networks used in healthcare, criminal justice, or finance (*Ethics*, 2021).

## GDPR and Proposed Adaptations

The General Data Protection Regulation affects neural network creators as they must abide by certain rules. GDPR has caused businesses to have an exodus in subscribers for products. GDPR requires that a company or developer must ask for consent to use a user’s personal data. The company records everything a user does in the app. If the company that hired me asks for permission and discloses what information will be recorded for algorithms the company should be all set. Doing this will abide by the GDPA’s stance on transparency. The GDPR also affects personalization by their “right to be forgotten rule.” This affects storage limitations, as data can be let go by the company if a user requests for their data to be removed. The GDPR wants data to be kept secure, so if the company keeps the data secure and protected then the company will be abiding by that policy (Spillane, 2022). As long as the company asks for permission to record the user’s activity on the website, remove user data if requested, and take accountability for the data if it gets stolen or lost, the company will abide by GDPR rules.

References

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