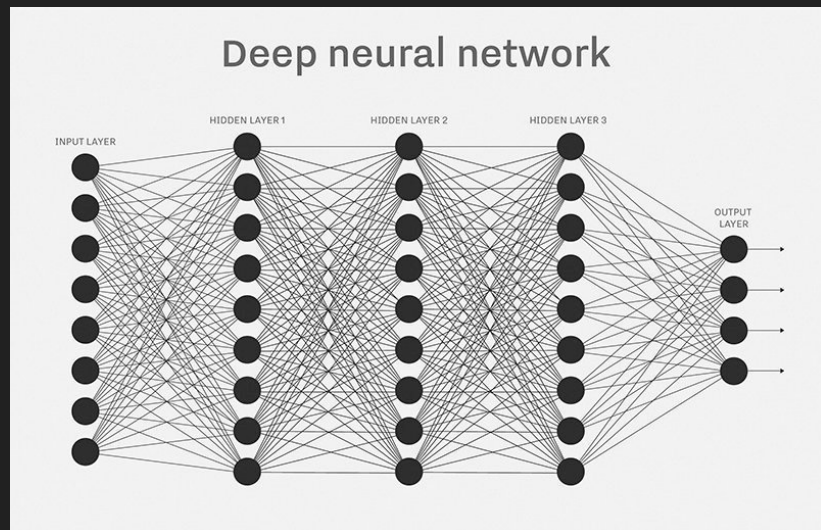


Machine Learning in Computer Networks

Charlie Davidson

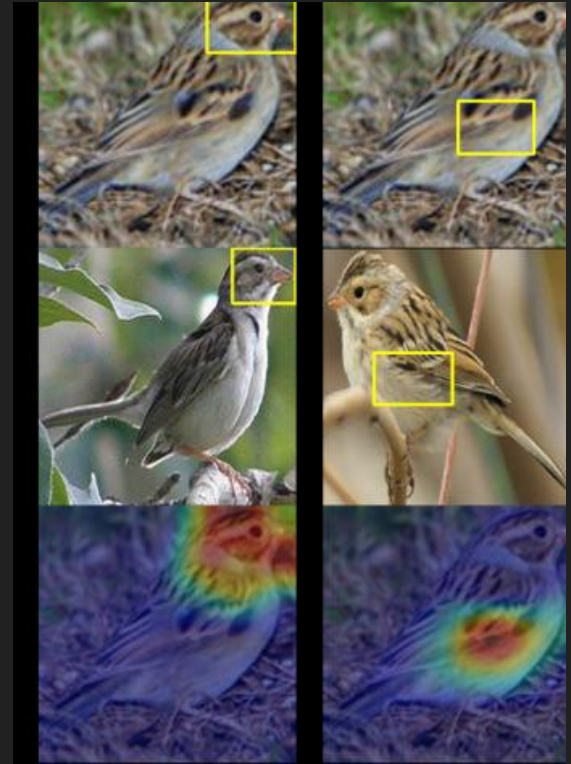
What is Machine Learning?

- Machine learning is an emerging field in computer science which allows systems to dynamically adapt to large sets of data
- Machine learning can figure out solutions to problems without explicit instructions from humans



How does it work?

- The algorithm consists of many connected “neurons”, and each connection has a specified weight.
- **Training data** is sent through the network to train the network to be sensitive to whatever data it’s going to be analyzing
- Through repeated iterations, the weights of the connections are fine tuned
- The program can then start identifying solutions outside of the initial training data



Applications of Machine Learning in Networks

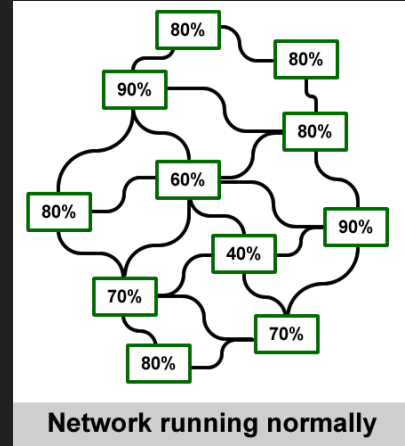
Network Performance

- Machine Learning can take in large amounts of data about network usage to divert traffic to better utilize the entire network
- Can respond to sudden spikes or drops in connection usage
- Can also find patterns in network usage to predict how traffic may change in the future
- May take in external data such as time of day, time of year, etc.



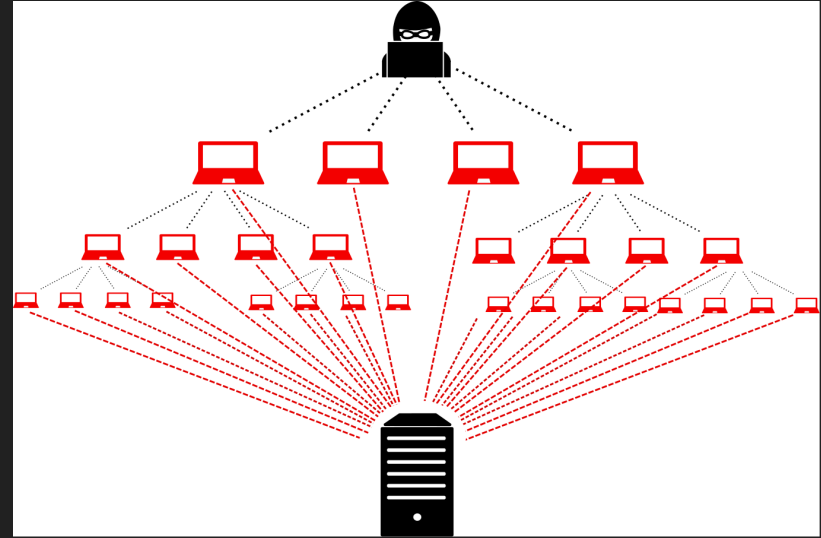
Network Health

- Machine learning can see if a node is beginning to fail and alert a system administrator to prevent a system-wide failure
- Can be used to predict spots in the network where a failure is likely to occur
- This can be done by feeding data from nodes which have failed in the past, and seeing if there are any indicators right before it failed (Traffic suddenly drops, becomes sporadic, etc.)



Security

- Can detect a compromised node in the network (compromised to hackers/intruders)
- Detect suspicious activity within the network
- Can anticipate and prevent security attacks such as DDoS attacks
- This can be accomplished by running simulated attacks and seeing how the machine learning algorithm responds



Questions

Sources

Burke, John - “What is the Role of Machine Learning in Networking?”

Extreme Marketing Team - “Towards Machine Learning in Networking: Benefits Begin Now”

Cooney, Michael - Cisco: How AI and machine learning are going to change your network