Name: *Omar Rashad Salem*

Course: *CV - prof.Heba*

Assignemnt No.: *7*

QUESTIONS

1) Explain the concept of a "dead ReLU" and why it can occur during training?

ans:

- **Dead ReLU occurs when a ReLU neuron gets stuck outputting 0, causing it to become useless and potentially harm network performance.**
- **WHY?**
  - **drastic updates to weights specially during initialization can cause a dead ReLU**
  - **majority of input is negative combined with high learning rates also can cause a dead ReLU**

---

2) What is dropout in neural networks. How does it prevent overfitting?

ans:

- **is a regularization technique used in neural networks to prevent overfitting**
- **prevents overfitting by forcing the network to learn with fewer neurons, the dropout layer helps to prevent the network from memorizing the training data and instead learn more generalizable features. (learn don't memorize!)**
- **in Loss function:**

$$L = \ldots + \lambda R(W)$$

---

3) Given a neural network with a dropout rate of 0.3, calculate the probability that a specific neuron is dropped during a forward pass?

ans:

`30%`

4) Discuss the concept of early stopping in the context of training neural networks. What are the potential advantages and drawbacks?

ans: Early stopping aims to stop training once the model starts to overfit, preserving its generalizability.

- **Advantages?**
  - **Reduces overfitting: learn the data don't memorize it!**
  - **computational efficiency: saves time!**
  - **Prevents model degradation: prevent model from becoming worse if continued training!**
- **Disadvantages?**
  - **NONE: just kiddin! :D**
  - **Difficulty in debugging and interpreting**
  - **Difficulty in choosing stopping criteria**

---

5) Explain the idea behind transfer learning and how it can be beneficial when training neural networks?

ans:

- **Transfer learning: Taking a shortcut by using weights learned from another trained model on a specific dataset/s.**
- **It's obviously very beneficial because it saves alot of time and boosts performance by widen the dataset we have with others datasets**
