Improving Neural Network performance

1) Vanishing Gradients
   - Activation functions
   - Weight initilization

2) Overfitting
   - Reduce complexity / Increase Data
   - Dropout layers
   - Regularization (l_1 and l_2)
   - Early stopping

3) Normalization
   - Normalizing inputs
   - Batch Normalization
   - Normalizing Activations

4) Gradient checking and clipping

5) optimizers:-
   - momentum
   - Adagrad
   - RMSprop
   - Adam

6) learning rate Scheduling

7) Hyperparameter Tuning
   - No of hidden layers
   - nodes / layers
   - Batch size

Early Stopping in Neural Networks:

If we train our data in very higher epoches It will lead us in overfitting so, to get free from Overfitting we will implement Early stopping concept of the keras.

Harmo model train garda if overfitting vayo, accuracy Improve vayena, Loss decrease vayena vaye Early stopping ley automatically epoches rokdinxa ra hami lai final resut dinxa (parameters values)

keras ma we use call backs to implement the Early Stopping.

Callback = EarlyStopping(

Monitor = "val_loss",
min_delta = 0.5
patience = 5
verbose = 1 (0 or 1)
mode = "auto" (fix it)
restore_best_weights = True
:)

Arguments:

- Monitor = "val_loss". It will look for val loss either our val_loss is decreasing or not.

- min_delta = 0.5. paila epoch ko val_loss ra current epoch ko val loss ko value diff value ≥ 0.5 vayo Vane matra further epoch ma train hunxa natra early stopping triggred hunxa ani further training hunna.

  Example:

  1st epoch: val_loss = 5.
  2nd epoch: val_loss = 4.5 (Prev_current = (5 − 4.5) = 0.5) train continuous
  3rd epoch: val_loss = 6 (Prev − current) = (4.5 − 6) = (−1.5) training stops
  (As −1.5 is less than 0.5 so, further training stops)

- Patience = 5. 5 ota epoch samma kunxa val_loss (ghatxa) improve hunxa ki nai.

- Verbose = 1. Displays output as early stopped applied on screen. 0 gives no information in screen about early stopping applied

- Mode = auto. keras auto detects what to do. min, max also can be set. val_loss min vako observe gar vaneko max ma chai accuracy improve gareko observe gar vaneko tesko lagi. (val_accuracy xalchnu parxa monitor ma)

- restore_best_weights = True. yesle chai paila kunai epoch ma ramro accuracy aako or ramro loss ghateko wala parameters lai Save or set garxa.