1801CS35
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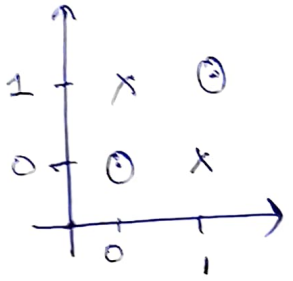
Q1) XOR function is given as,

$$XOR(X,Y) = \begin{cases} 1 & X \neq Y \\ 0 & X = Y \end{cases}$$



← There is no clear linear seperation.

i.e) There cannot be any $w_1 x + w_2 y$ that captures this.

And Sigmoid function is useful only if there is a clear threshold.

Let's assume threshold 't'

$1 \cdot w_1 + 0 \cdot w_2 >= t$ $\quad$ $0 \cdot w_1 + 0 w_2 < t$

$0 \cdot w_1 + 1 \cdot w_2 >= t$ $\quad$ $1 \cdot w_1 + 1 \cdot w_2 < t$

$\Rightarrow w_1 >= t,\ w_2 >= t,\ 0 < t,\ w_1 + w_2 < t$

$\therefore$ Contradiction

2) Cosine similarity captures the angle difference irrespective of dataset size. i.e) Higher cosine similarity means lesser angle hence more similar are datasets.

While inner product cares about angle and magnitude i.e. it takes into the account the size and angle of vector. If you normalize your data to have the same magnitude.

Sometimes it is desirable to ignore the magnitude, hence cosine similarity is better. But if magnitude plays a role, inner pdt would be better as similarity measure.

~~Let~~ If model is trained on Twitter page. And for testing we take a small section to verify similar origin. We can use cosine similarity. Test data is smaller than trained

⇒ Cosine similarity will help.

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3)

In ensemble learning we have different techniques like bagging and boosting for improving ML performance.

In bagging multiple models learn independently and prediction is like an average.

In boosting models learn sequentially and adaptively improve.

Similarity:

(i) Both are ensemble learning

(ii) Both generate several training datasets by random sampling

(iii) Prediction is done using average of N learners

(iv) Reduction of variance

Dissimilarity:

(i) Combination are different w.r.t classes.

(ii) Bagging reduces variance, Basting reduces bias

(iii) Model weighs are assigned differents (Same in bagging w.r.t performance in boosting)

(iv) Model trained independently in bagging dependently in boosting

(iv) Bagging does random sampling while boosting samples w.r.t incorrect

(v) If classifier is unstable we bagging; otherwise use boosting.