model generally used in reinforcemet learning algorthms where the concept is that the more delay you have in getting an anticipated reward, the more its value decreases. Just like that, ~~day~~ far away points in my model will have less value in our probability model or you can say less importance. So, probability for a positive point changes from ϕ_x to $\gamma^d \cdot \phi_x$, where γ^d is ~~dist~~ gamma to the power of d, distance.

Lets say ϕ_x is 0.4 and ~~we have~~ we have positive points with $d = 3, 4, 5$ and negative points with $d = 2, 6$. gamma is 0.9.

$$\cancel{P(\text{positive}) = \binom{k}{x} \cdot (3\phi_x)(4\phi}$$

$$P(\text{positive}) = \binom{k}{x} \cdot (0.9^3 \phi_x)(0.9^4 \phi_x)(0.9^5 \phi_x)(1-\phi_x)0.9^2(1-\phi_x)0.9^6$$

~~So we~~ .

So we can write $\binom{k}{x} \cdot 0.9^{20} (\phi_x)^3 \cdot (1-\phi_x)^{0.2}$.

Thus 0.9^{20} is decay, which I used in my binomial distribution function. We can also derive ~~0~~ our new model for P(negative) using the same way.

One problem that KNN in this domain may face is that what if my search for KNN returns 5 points ~~where~~ whereas k is assigned as 4 and that some points have same distance? ~~Either con~~ One way is to consider 5 points instead of 4 but in another ~~as~~ case my search may return 7 points and we have varying k for different searches which will make KNN biased for different query boxes. The approach I took is to restrict number of k points, so that 7 points in the earlier ~~case~~ case is somehow being limited into 4 points. I used monte carlo sampling

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In this case. My search returns a list of k points. If the number of points is greater than assigned k, then we find out the highest ~~distant~~ points in the list and ~~the~~ take them out and ~~we~~ our list size becomes z. Then we need to sample (k-z) points from that taken out set of points. Let s be set of taken out points. So probability distribution of positive in S is $\dfrac{\text{number of positive points}}{\text{size of S}}$.

The same way we calculate probability distribution of negative points. ~~There we~~ Then carry out montecarlo sampling from the probability distribution until our sample size becomes equal to (k-z).