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	AI61003 Linear Algebra for AI & ML Assignment of- Problem 08
(a)	In step 1 we find for every sample, the "closest" of the k cluster repres-
	-entatives. The distince b/w the
	zi is measured by the norm
	-entatives. The distince b/w the sample xi and the supresentative z; is measured by the norm    xi - z;     Let us assume that in owe applica-
T.	2 (1-N) - M.
clust	Since for every sample xi and every
	11 Ki - Lilla lalong with other constant
	number of constant-time operates) the computational time ! = NKt where t is the time it materialed to
	of two vectors.
\$ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 (1º In a continue of the
	+ (time to compute 2- nomm) = n + 2n = 3n
1/	$=$ $T_1 = 3nkN$
(1-)	
(b)	Let after finst step,  c  = size of ith cluster = s: for i=1k.
	In second step for every cluster we compute the average of all
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the vectors in the cluster.	
= (no. of additions) x (computates	
for one addition) + (divisionby	_
comoutat not	_
(to is the time negd to compute	_
ith cluster representative).	_
	_
So the computational time complexity	_
$T_2 = \sum_{k=1}^{\infty} t^k = n(N-k) + K$	_
	2
(use that z si = N)	38
=) 12 = MN - (N-1) K (12 MN) for wege	_
Total consolitational consolexity Tot	
pare it exations is $T = T_1 + T_2$	
tot	
T = 3nkN + nN - (n-1)k	
tot	- 1
So the no. of computations Tio involved	L
in 10 it evations is -	
LOW TO THE STATE OF THE STATE O	
110 = 10 Ttot = 30 nk N + 30 nN-10(n-1)k	_
≈ (30k+10)nN (fou largeN)	
	_
	—
	_
	_
	_
	the vectors in the cluster.  t:= (si-1)n+1  = (no. of additions) x (computations) for one addition) + (division by emputational (t. is the time negd to compute ith cluster representative).  So the computational time complexity  T2 = 5 t: = n(N-k) + k  i=1 k = nN-(n-1)k  (use that \(\frac{1}{2}\)si = N)  =) T2 = nN-(n-1)k (\(\frac{1}{2}\)nN for large N)  Total computational complexity T of one iteration is T= T, +T2  T= 3nkN + nN-(n-1)k  So the no. of computations To involved in 10 iterations is -  Tro = 10 Ttot = 30nkN + 30nN-10(n-i)k \(\frac{1}{2}\)00 (30k+10)nN (for large N)

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