	GHARDA FOUNDATION'S GHARDA INSTITUTE OF TECHNOLOGY GIT SHARDA INSTITUTE OF TECHNOLOGY GIT STATEMENT OF TECHNOLOGY
	Experiment No. Date :
	
9.1.	Apply single linkage clustering and draw dendrogram on the following data. Suppose we have a six objects (with name A. B. C. D. F. F.) and each object has two measured features
	(21, and 22)
	07, 22
	A (1 1 0
 	8 1.5 1.5 (,
· · · · · · · · · · · · · · · · · · ·	C 0 5
	D 3 4
	E 4 4
	f \3 1. 3.5 \\
	A B C O F F
	A 0 0.71 5.66 3.61 4.24 3.20
	B 0.71 0 4.95 2.92 3.54 2.50
	c 5.66 4.95 0 2.24 1.41 2.50
	D 3.61 2.92 2.24 O 1.0 0.50
	E 424 3.54 141 1.0 0 1.12
	f 3.20 2.50 2.50 (0.50) 1.12 0
	$d(A_1B) = (1.5-1)^2 + (1.5-1)^2 = 0.71$
	d(A,c) = \((5-1)^2 + (5-1)^2 - 5.66
	$d(A_1D) = (3-1)^2 + (4-1)^2 = 3.60$
	d(A,E) = (4-1)2 + (4-1)2 = 4.24
	$d(A \cdot F) = \sqrt{(3-1)^2 + (3.5)^2} = 3.20$
	d(B(1) = (5-1.5)2 + (5-1.5)2 - 4.95
	$d(B,D) = \sqrt{(3-1.5)^2 + (4-1.5)^2} = 2.92$
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į		d (B.() =	(4-1-5	12+(4-1.5)		3-54	1	· · · · · · · · · · · · · · · · · · ·	_
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		d(CID) =	(3-4	12+	(4-5)	2 =	2.24			
Ħ			1	2 .	1 , 5	12 -	1.41	•		
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\mathbb{H}		qCit1 -	V (3		1.0.7			- ; 1		
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		d(A,A) =					!:	^		
		q(c,c) =	0 '		· · · · ·		<u>i </u>	ļ r* .		
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	$d(D,f) \rightarrow A = \min(dDA, dFA) = \min(3.61, 3.20) = .3.20$ $d(D,f) \rightarrow B = \min(dDB, dFB) = \min(2.92, 2.50) = 2.50$ $d(D,f) \rightarrow C = \min(dDB, dFB) = \min(2.24, 2.50) = 2.24$ $d(D,f) \rightarrow C = \min(dDB, dFB) = \min(2.24, 2.50) = 2.24$ $d(D,f) \rightarrow C = \min(dDB, dFB) = \min(2.24, 2.50) = 2.24$								<u>3</u>
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(B,B)	0	4.95		(to
	4.95	Φ	1-41)		
J,(7,0)	2.50	1.41		<u> </u>		
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Wen glet	z min(d	DC, dFC	(de) =		24,2-50,1.1	чı)
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Men dest Dist	= mi n(d	DC, dFC	(Dif)	,E),C	24,2-50,1.1	<u>ч1)</u>
$d(o, f) \in A$ $(a, b) \in A$ $(a, b) \in A$	= min(d	(A18) 0 2.50	(Dif) \$ 2.50	,E),C		
Min diet Dist (A18)	= min(d	(A18) 0 2.50	(Dif) \$ 2.50 C 3.61, 2.9	(f) ₍ C		
(0,F), E), € (1,B) (1,B) (1,B) (1,B) (1,B) (1,B) (1,B)	= min(d	(A18) 0 2.50	(Dif) \$ 2.50	(f) ₍ C		

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$dist((E_1A),C) = Min(dist(E_1C), dist(A_1C))$ $= min(2,2)$	
d ((EA), B) = min (d (EB) o dist (AB))	
$= \min_{z \in \mathcal{D}} (2.5)$ $= 2$ $d((f_1A), 0) = \min_{z \in \mathcal{D}} (dist(f_1D), dist(A_1D))$	
$= \frac{1}{2} \operatorname{min}(313)$ $= 3$	
EIA O B D C B D C C 2 O C C C C C C C C C C C C C C C C	
Step 2: Consider the dist matrix obtain in Step 1:	Since
B, C dist is minimum, we combine B & G d(B, C). (E,A) = min (dest (B,t), dist (B,A), dist (CE), dist	
$= \min_{z \in \mathcal{L}} (2, 5, 2, 2)$	
dist((B,c),D) = min(dist(B,D), dist(c,D)) $= min(3,6)$ $= 3$	

CHAKDA FOUNDATION'S GE GHARDA FOUNDATION GHARDA INSTITUTE OF TECHNOLOGY GIT INSTITUTE OF TECHNOLOGY Experiment No. Date: Q.2-A13 · B, C D AZ B, C 0 0 Hep 3: Consider the dist maker obtained on Step f(B,C) dist is minimum, use combine there - min(dist(E1B), dist(E1C), dist (A.B), dist(AC) =min (2,2,2,5,2) EAB, C D EABC Step 4: Combine D with (FABC)

	Experiment No. Date :
	1
Q. 4·	Write a Short note on:
<u> </u>	Accuracy and Error Measures en kindel Evaluation:
ー	Accuracy of classifier M acc(M) is the percentage of
	test set tuples that are correctly classified by model M
	Training Set:
	Training set is subset of data used to train build the
	Model. Validation Set:
	It is used for parameter tuning but it can not be the
	data. Validation data can be training data, or a subset of
· · · · · · · · · · · · · · · · · · ·	training data.
* 	-tech only
	Test set:
	in training process. The model's performance is evaluated
	on unseen data.
	The accuracy metrics are calculated with help of machine learning Confusion Matrix.
	Accuracy = No. of Correct predictions Total of all cases to be predicted

	True Rosithu	, faise Negative
	a b	
	c c.	True Negative
	felse > 4	The Negative
	accuracy recognition rate =	= <u>TP+ TN</u> P+N
	0 0	
<u> </u>	emos rale = FP+fN P+N	
	Specificity = TN	
	Precision = TP TP+ FP	
	1	,
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		Experiment No.
=	7	Cross valid atton:
-	0)	Cross validation
•	\rightarrow	A Statistical Method or a = resumping procedure
		Jused to evaluate the skill of machine learning models
	1	on a limited data sample.
		Use Cross-validation to detect overfitting i'e failing to generalize a pattern
		To deliveralize a batteri
		5teps involved in Gross validation are as follows:
		1. Reserve Some portion of somple duta-sel
	P	2. Using the rest data - set train the model
	ì	3. Test the model using the reserve portion of date set
		Common Method used for Cross validation :-
	1.	1. Validation set approach
	·	2 Leave - P-out conss validation
)		13. 1 eave - one out cross validation
		4. K-fold cross validation
		5. Stratifield k-fold cross validation
		Application:
		- "It has scope in medical research field
		- It can also be used for the meter-analysis
		Us it is already being used by data grientist in
		field of medical statistics
	 	
	 	

cJ	Bootstrap :-
→	- INLOWES well with Small data gets.
	- bootstrapping is a way to quantify the uncertainty in your model while Cross validation used for model
	Selection and measuring predictive occuracy. - Samples the given maining tuples uniformly with replacement
	i.e each time a tuple is selected it is equally likely to be selected again and re-added training set
	- Several bootstrap methods, and a common one is
	- Suppose we are given a data set of d tuples. The data set is sampled at times with replacement resulting in a taining set of d samples. The
	end up forming the test sut
	Repea
	ac(m)= = (0.632 × acc(Mi) +cst 5+ + 0.868 × acc(mi) +rain - set)