Probably Approximately Correct Learning

(PAC Learning) -> A good learner will learn with high probability and close appoximation to the target concept. concept. with High probability, the selected hypothesis will have lower the error ("Approximately correct with the parameters & and S.

(Epston) (delta) PAC learning requires:

→ Small parameters E and 8

→ with probability at least (1-8), a system

learn the concept concept at most E. E is upper bound on error, in accuracy, i.e. the hypothesis with error less than E.

Accuracy = 1-E



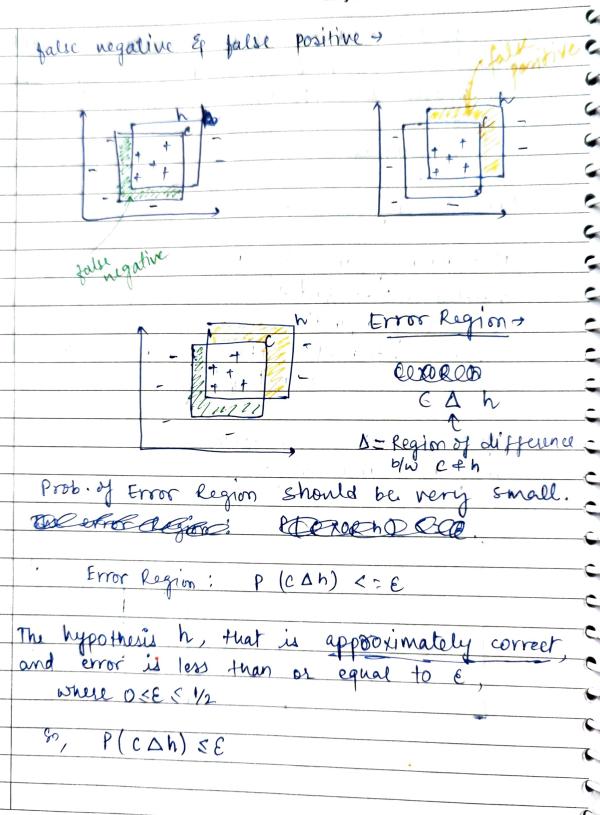
3

(Religious Jain Minority)

	s aires the probability of failure en achieving
•	S gives the probability of failure in achieving this accuracy of (01851), the hypothesis generated is apportmately correct at least (1-8)
	this accuracy of the correct at least (1-8)
	generated is apportment
	of the time.
	confidence = 1-8
	PAC learning Example -
	AFTE (COLLINE)
	N number of car having Price of Engine Power (p,e) as baining set -> find the care is family car or not.
7	N manuer of car of the car of not.
	baining set -> find the con a
4	C -> Target function sepresents -> family car
	Instances within the rectangle represents > tamily car outside > not family car.
7	outside - not family car.
· -)	Hypothesis h + closely approximate C, and there
	may be error region.
	1,7216 1 MY 1/11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	m C N I I I I I I I I I I I I I I I I I I
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	,) (1), ,



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Subject: Mathematics for AI & ML low generalization error with high probability-P(P(CDh) <= E) 7 1-8 PAC rearnability for axis - aligned rectangle: h, is the tightest possible rectangle around a set of positive example. is subset of c, hence Error Region = C-hs Approximately correct > If an hypothesis lies between his and C (shaded legion) then it is approximately correct.

The generated hypothesis

does not touch any of these region.



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	•
	then error fegion is greater than & and not approximately sorrect, because the error region got increased.
	here, error region > E so. Notapproximately correct.
-XX	each side of restangle than it will be correct hs.
	Error Region;
	Error Region = Sum of four rectangular strips < E Each stropp is atmost E/4.
	Prob. of positive example falling in anyone of the strip > (error region = E/4)



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	Prob. that a randomly drawn positive example misses a strip = 1-8/4
	Prob. that a runching 1-6/4
	misses a stelp
	$p(m)$ instances misses a storp) = $(1-\epsilon/4)^n$
-	p (m marances mass
	of instanta miles any strip) < 4 (1- =)
	P(m instances mies any strip) < 4 (1- =)
	and we want this to be almost 8.
_	and we want 4000
	$80, \qquad 4\left(1-\frac{\epsilon}{4}\right) \leq 8$
	in a faking (natural) log
	Dinding both the sides sig
	Dinding both the sides by 4, taking (natural) log and searranging terms, we get
	m > 4 (0g(4/5)
	(4) Joe (4/6)
.	so provided that we take atteast (4/6) log (4/6)
-	so provided that we take atteast it is independent examples from c and use the tight rectangle as our hypothesis h, with confidence prob. atteast 1-8, a given point will be misclassified with error prob. at most E.
_	independent excertises h with confidence
	rectangle as our vigoriouses point will be
	prob. atteast 10, a gruent per most E.
	misclassified with error prob. at
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Buchismath Ginzladia Ganida

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			Subject: Mathematics for AI & ML			
	Eyav	uple:	4			
			Carried State of the Control of the			
(1)	Sr. No	Error (h1)	6			
		0.001	Hypothesis he generated the errors			
	2	0.015	with respect to peice and engine			
	-3	0.07	power of given 10 samples,			
	Ч	0.003				
	5	0.035	Given 6=0.05, 8=0.20			
	6	0.045	G			
	7	0.027	P(h1)>=1-8			
	8	0.0652/	5 2rd d eth value are			
	9	0.012	P(h1) = 8 = 0.80 } greater + hon & f			
	10	0.036	10			
			\$ 1-8= 1-0·20: 0·80			
	1. 0.80 2, 0.80 (True)					
		Hence hs	ie probably approximately correct.			
(2)	Sr.No	Error(h2) E	Errors generated by hypothesis h2.			
	1	0.012				
	2	210.0	given & = 0.05 , 8 = 0.20			
	3	0.071 ×				
	4	0.063 V	p(hz) 7, 1-8			
	5	0.022	P(h2) = 7/10=0.7			
	6	0.045	1-8= 1-0.20 =0.8			
	7	0.011				
	8	0.029) 0.7 7,0.8 false			
	9	0.066	h, is not probably appearimately			
	10	0.031	h. is not probably appearmately correct.			
	Prof. Jaya	Gupta	Department of Computer Science & Engineering (AI & ML)			