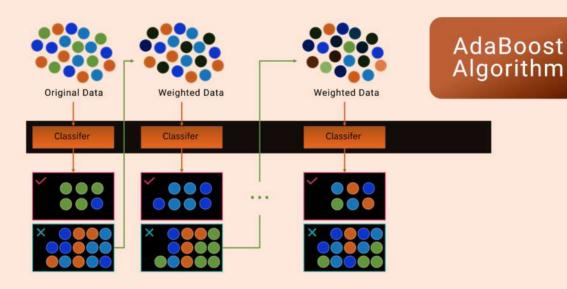
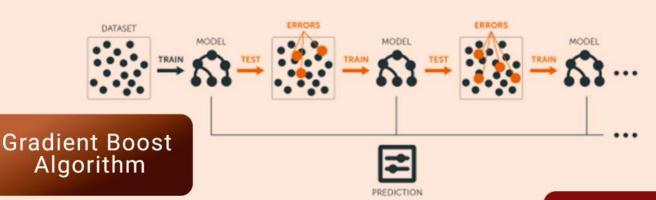
Comparision between AdaBoost and Gradient Boost Algorithm



S.No	Adaboost	Gradient Boost
1	An additive model where	An additive model where shortcomings
	shortcomings of previous models are	of previous models are identified by the
	identified by high-weight data	gradient.
	points.	
2	The trees are usually grown as	The trees are grown to a greater depth
	decision stumps.	usually ranging from 8 to 32 terminal
		nodes.
3	Each classifier has different weights	All classifiers are weighed equally and
	assigned to the final prediction	their predictive capacity is restricted
	based on its performance.	with learning rate to increase accuracy.
4	It gives weights to both classifiers	It builds trees on previous classifier's
	and observations thus capturing	residuals thus capturing variance in data.
	maximum variance within data.	



	Mach	ine Learnir	ng : Gradient Bo	oost Algorithm					
	1								
	- Reght	ussion Phobe		It six sequen					
		grade lating	A Land Harting Comment	thousand AE					
Meen	Exp (x1)	Degree 60	Salary(y) 50 K	e part ones					
	2	BE	50 K	- Sya Killer					
1 0 638	101 3 3 miles	Masters	7016	Stage wise 1					
(9	3 Masters 70K 5 Masters 80K								
	6 PHD 100K								
ine in	Devision themp: version tire unsted only upto 1								
	There were more white and the set of the set								
=>	STEPS for Gradient Boosting.								
thread	and the contract of the contra								
Step 1.	Create a Base model.								
Tool .	- Ada Boos ting can handle missed pleadic tolk as								
	$\hat{y} = Average of Dependent Feature (y)$								
)								
	:. ŷ = 50 K + 70 K + 80 K + 100 K = 75 K.								
	4								
	75 K	will be +	he base mode	(.	A Company				
		7.14		She will be a first	dead -				
	Exp(x1)	Degree	Salasu (y)	ý	1				
	2	BE	Salary (y)	75 K					
	3	masters	70K	75K					
	6 PHD 100K 75K								
Ston 2	Comado	the por	duals or Erro	<i>L</i> h.					
Step 2.	winpure	THE KEST	on the		•				
	Ri-	4-4							
	$R_1 = y - \hat{y}$								

SAHIL JOSAN									
	Exp(x1)	Deghee (x2)	Salary (y)	g RI					
	2	BE		75K -25					
	3	masters	7 2 3	75K -5					
	5	masters		75K 5	22				
100	6 6 6	PHD	100K	75K 25					
	HOLD WE all times at a col								
STEP 3	we cons	thuck the ne	act decision i	tree with in	iputs				
	we construct the next decision tree with inputs x1 and x2 and target feature R,								
	Togo. That is								
	75 A DT-1								
	Har Q Q MARKET								
	260								
4	I/e of D7-1 = x1, x2 and R1								
	0/P of D7-1 = R2								
	V	F-47 2-	75K - 5	707					
- 70	Jan sa	(y- ŷ	(o/p of	1st Decision	Thee.				
	Salary (y	j g Ri		halfertal d	10.05				
	50 K	75K -2	The state of the s	- August					
	70K	75K -		Wales of					
esiduals	SOK		alalag3 alt	Althorage metal	Steps				
	10017	75K 25	20	et Ema					
		P 180	to by - Update	123					
Step 4	Now ca	I culate phedict	ed output. Ty	+ 12					
	12	म अन्यक्ति ए	A LA LA	Salaty (B)					
	75	+ (-23) =	75 - 23 =	52					
	一年,产	1001 5-	75R ~5	- Male					
	But out	intial output	according to s	alary feature	e was				
	50 K	and now upo	dated predicted	output com	ies				
	5216	that means o	ur model is	overfitted.	70				
		u's we have to							
				11					

	X = Lea	ening	Rate.	Csx	Depared ((and april			
	12 × 32								
	Predicted	output	(ŷ) =	75 -	+ x (-23)	2			
	75K 5	1	108		Defea In				
	Learning	late !	can l	e ani	value : 0	1,001,0	ooletc.		
	Learning hate can be any value: $0.1, 0.01, 0.001$ etc. Here we assume $x = 0.1$								
souls.	Pladic ted	output	(q).	= 75	+ (0.1) (-23	we role	3700-3		
		Shale	10/ 1=	72.	7-10 2 x	lama IX			
		-							
	Similally	for 2	nd he	wrd		7			
	0	75+	x (-	3) =	75 + (0.1)	(-3)			
			00	7-4=	74.7				
I Save Th	Comment	Diese I	-	_					
	Salary (y)	ŷ	RI	R2	Updated	if ol I			
	50 K	75K	- 25	0.0		V			
	70 K	75K	-5						
Thee	80 14	75K	5	3		G K e- i			
	10014	75K	25	20	77	O par July			
		E	- 20	20-	75K	7.65			
	75 K L	ile di	63	25	TER	Mal			
Step5	Now with	the	updat	ed ŷ	again com	pute the 1	2 esiduals		
	or Ehrol		2	42	JEK	7 00			
,	R3	= y.	· Upd	ated i	<u></u>				
	+ 101+	1 1	u.Tua	Leterate	in state	Alone Co	1 4 93t2		
	Salary (y)	ŷ	RI	R2	Updated y	R3			
	5015	75K	-25	-23	72.7	-22.7			
	70K	75K	-5	-3	74.7	-4.7	16		
Intel :	80/2	75K	5	3	75.3	4,7			
291	100/2	75 K	25	20	000-77 m	23			
70	10914 A +100	45- Jos	2010	(Jun 2)	that mean	22.14			
7.0	~	Α.							

Step 6	Based on our new talget flature R3, we will							
	construct our next decision thee.							
	- Emely Classification Peoplemi							
	I/P [x1, x2, R1] I/P [x1, x2, R3]							
	InvoxQ1 Intidutal Quality							
	66 - 66							
	0000 0000							
	O/P[R2] O/P[R4]							
	beg yes							
	750K Normal							
1000 4	Now again we depeat the whole steps.							
0	Now again we depeat the whole steps. Cheate updated ŷ 2							
	Step 1 - Cheeste a Book modal?							
2	(reale output feature R5 by substracting							
	(reate output feature R5 by substracting Salary (y) - Updated ŷ 2							
(3)	Ten again phovide this R5 as the input to decision							
	Ten again provide this R5 as the input to decision thee [3] and R6 will be the output and so on.							
	step 2 Compute the Residuals of Estoss							
	This will keep on going until the value of R							
A ENER	keeps on decreasing or the value of n-estimator							
(g-6)	is heached							
5.0-	5.0 0 800 8,05.2							
3.0	Final Formula:							
2.0	200 1 100 1 10 1 100 100 100 100 100 100							
-0.5	F(x) = ho(x) + q, [h, (x)] + q2 [h2(x)]							
3.0	1 20 xn [hn (se)]							
5.0	Base Learner							
-0-5	LE SOL MOS TOL ON CO							
	F(oc) = & x: [hi (x)] > Gradiant Boost							
	1=0 Algorithm.							

SATIL 303								
7	XG Boo	st : Extreme	e Gradient Bo	oost Algor	ithm	5-19-2		
	- Pinchu	Classification	Platfem:	-22)	2007			
22	Britag	Classification	STO I NUXO					
	Salary	Chedit	Approval	4 2 6 1 7 6	part, a	ian ste		
	0	gad	0	0 -	- No			
	> /	Good	717		Yes			
	L= 50K	Good	9999	(-10)				
	750K Bad 1							
	750K Mormal 1							
	6=50K Hormal 0							
C		a.		to upolat		(1)		
Stepi	Create a	Base moc						
	It is	a linary	classification	problem	1 80	the		
•	average	output will	l de 10.5	Salasy (y				
		758 - 5	L Paul	710-76				
18 16 b 3	of ing =	10.5	wint solve be	1 things	Ten	0		
· NO 07	how try to	o 501 od, 30	d Rbs wil	IND [8]	thee			
Step 2	Compute	the Residu	als of Es	brohs.				
X	a gulora,	= 4-4	by an depot	will kee	This			
100	William No. Ale	auto Calle	To Lacidaria	s ala-way to	Adde			
	Salary (xi) Credit(x	2) Apphov	al (y)	- Else	R, (y-g)		
	1=50 K	Bad	0	0	.5	-0.5		
	L=50K Grood 1 0.5 0.5							
	L=50K Good 1 0.5 0.5							
	72 50K	Bad 0.5				-0.5		
12	75°K	Good	1	C	0.5	0.5		
	75°K	Norma	el de de	1 5158 = 0	· 5	0.5		
	Y= 20K	hlog mo			•5	-0.5		
	mt Broat		1667 4412 po		P()			
	A Frank Harry	A		0-1		715 2 5 5 5		

Step 2 We construct decision there in sequence with input Salary (X1), Chedit (X2) and ofp (R1)
imput Salary (XI), Credit (X2) and ofp (RI)
in from adjour (2.2-1) 213
in from adjour (2.2-1) 213
Salaky
Salaty 0.5 2=50K 750K
1=50K 750K
-0.5,0.5,0.5,-0.5
(+5)2) w.2 - 10
Step 4 We calculate Similarity weight (S.W)
Formula = (\(\mathbb{E} \) Residuals \(\)
€ Pr (1-Pr)
12
S.W (K=50K) = (-0.5 + 0.5 + 0.5 - 0.5)
[Left Side] 0.5(1-0.5)2+ 0.5(1-0.5)2+
0.5 (1-0.5)2 + 0.5 (1-0.5)2
Ph: Base Learner 0/P
: S.w (1=50K) = 0
Calendary Town I want to a North Control of the Con
Similarly 2 bad
S.M (750K) = (-0.5 + 0.5 + 0.5)
[right side] 0.5 (1-0.5) + 0.5 (1-0.5) +0.5 (1-0.5)
SW=1 SW=0-82 SW=0 SW=1
S.w (>50K) = 0.25 = 0.33
where assume 0:75 you of the limit : as

1	S.W TS	alary] = (-0	5+05+0	15 - 0.5 - 0.5 +	0.5+0.5)2				
	(Root) 0.5 (1-0.5) + 0.5 (1-0.5) + 0.5 (1-0.5)								
	P Maritis			+ 0.5 (1-0.5) + 0					
			- (1-0.5)		3 -				
	tal staff	Salary							
	5.w (&	pot) = 0.1	42	20					
	Carlotte Johnson - 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2								
,	Now Co	rlculate the	gain						
	5/8/5/8/5	200	-,30,200	5.9 4					
	Gain =	S.w (Left	one) + 9	S.w (Right Side)	No. of the latest the				
	7.88 K	I Alexander		- S.w (200t)					
	(1)	5) +1 CAM 1	Figh Kine 12	We talquist	5+ep 4				
	5	0 + 0.33	- 0.142						
	Charge	- Chelontein	NE) - 5	Famula					
	Gain = 0:19								
	Now BR	eak DT-1 in	to make a	depth using the	clit Feature				
	+ 62.0-1	13+3 + 2(3+	1-1/20	Left Side					
	(1-0-5)2	20 + 650	Salary Su	0=0.142					
		≤50K/	7	5014					
			asmer elp	PE Lave					
	SWED	Credit		Chedit	SW = 0.33				
		-0.5, 0.5, 0.5,	-0.5	-0.5,0.5,0.5	E CHEGOL				
		/			-0.5				
	Bad		Good	B/G/	Nohmal				
		510+ 5013	Mormal	(21/2 5) Mas					
510-17	- 0.5	0.5,0	15,-015	-0.5,0.5	0.5				
	Sw=1	Sw =	0.33	Sw=0	Sw=1				
		2810	5 6.25	S-m-(>50K)	0.5				
	3w:	Similarity w	eight.	-316	-0.5				
	The state of	U	J	Re Tina-1					

we can calculate information Gain by using Similarity weight. and the lest one will be selected which will have the maximum information Gain. solves to base learner [0.5] and on top of it, it apply log (odds). Log (odds) is one type Test data 0.5 Log(odds) = log(P) = log(0.5)= log 1 = 0 model output = o [o+x(i)] Here o: Sigmoid Activation Function. 0: Log (odds) on Base Learner [0.5] (1): Because Similarity weight = 1 FOR Salary 550 K and Credit (Bad) Sigmoid Activation (0) = Function 1+e-2 Here Z = 0 + x (1) where assume & = 0.1

· model	output	= 0-1	0+(0.1)1	30 - 1000 - Ca	99)
L Black marks	test :	online for	0 . 1	A bison	Yagira =	12 (MA)

Schered relied ((co)) o the manipular

in fermation harms 12 = 1 mathematical teleforty of the part wall work (

model output = 0:52.

This output will be i For Salary = < 50K Credit = Bad

Similarly we calculate if for all our hecords using Similarity weight.

	Salary	Chedi+	Approval	R)	Updated i	R ₂
	2=50K	Bad	0	-015	0.52	- 0.52
	L=50K	Good		0.5	0.58	0.42
	L=50K	Good	TO HOLL	0.5	0.58	0.42
	750K	Good	0	-0.5	0.5	-0.5
	750K	Bad	Actuation	0.5	0.5	0.5
	750K	Normal	Den Base	0.5	0+73 0.52	0.48
3	L=50K	Normal		-0.5	0.58	-0.58

R2 = Approval (y) - y (updated)

Now next decision thee will be trained with salary and credit as the independent feature and R2 as the dependent feature. where assume at a colony