V-1/Deep Learning)

which concerns in der

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- subfield of AI which concurs in developing computational theories of learning building leakning machines.

· Importance of ml
· dearns from data
· automates takes
· Improve decision making.
· Personalizes experience
· drives innovation.

Appl -> NLP

Healthcale

Agriculture

Self driving aus

algebracewity

ing & speech

How Machines Learn - · Joaining · Validation · Application

Data Collection

Data preparation

model Selection

Model Training

Model evolution

Model tuning

Deployment

Deep Learning- mitates way human gain certain hype of knowledge. subset of AI-

Reasons for DL. Analyze unstructured data
. Data labelling.
. Feature engineering.
. efficiency
. Vraining.

Appln -> Aerospace & defense

Financial services

Medial research

Industrial automator

Facial recognitive

Adv -> no need for feature engineering > solves problem on end bend basis > gives more accuracy

Disade - high perform we how . more time to tran . difficult to access its payour . Haid to maderstand -

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ML Field of Artifical Intelligence · Subset of Machine Learning structured & unstructured data · unstructed data (images, fext, audio) · large datasets → good performance smaller datasets · Less Interpretable Models-More interpretable models. · Can sun on GPV or more powerful Can sun on CPU & GIPUS · More accuracy lesser accuracy · More complex models. Less complex models · automatic feature extraction manual feature extraction · Longer toaining times. Fast training time with mutiple layers of learning.

Computer Vision, NLP learns patterns from data for prediction or decisions Usecases Regression, classification, clustering ex-7 · CNNS, RNNS, DBNS. Decision trees, SVM

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	Supolivised Learning	Unsupervoedler
Mana	Learns from labelled data. with input-output pairs	from unlabelled data
	with input-output pairs	from unlaselled data
क हेज्दी, क	Lead Transferrations of the control	spaceus francisco diff
	labelled training data	· Doesn'trequire ablled
madinish h		· somallik dahasiks
•	Predicts ouput based on input data	· Discovers hidden patterns of
	our month desired (1973)	Doesn't )
•	Receives feedback duling toaining	Doesn't Receives feedback-
The state of the state of	The state of the s	AND AND THE AND
	can test our model	· Can't test our model
	THE SHALL STREET TO STREET AND ADDRESS OF THE STREET,	e lesson accuracy
•	Desired output is given	· desired output is not given
5797		《1861年11 吴77年115年 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
•	Also called classification	· Clustering
ESCENICE:		Matheway Control of the property of the second
•	eg -> classification, regretion, object detection	· K-Mean Christering PCA.
, Stewart	object alternon	
-	I as maloss - ettings un	n define before training amodel
10.11	The string of a string of a	before training amodel
-4	halla size	and allesian of united and
4	no. of layers	principality materials
	no. of layers	es laues.
el/s	activation fur	
		MINS   Book and and

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h	Bias - phenomenon than skews results of an algo in pavor of against.
A	Low Bias - fewer assumptions -> form of target furction -> by model
-	Low Bias -> fewer assumptions -> form of target function -> by model  High Bias -> more assumptions -> unable to capture imp features-
	> To reduce high bias -> . Increase input feature  · Decrease right areazation time
	· Decrease right at a zation time
	· Use more complicate models.
2	· Increase towning data
	· In creak regularization term
4	Variance - changes in mode when using diff postions of training detaset-
*	how much random variable differs from the expected value.
-	Model -> high variance -> low bias frice versa.
	To reduce high variance ->, Reduce input feature
	· Don't use complex medel
	· Incluse training data
4	
	Bias Valiance Tradeoff - 10 20 Mars 10 10 Mars 10 10 Mars 10 M
	Trades   b w blas & variance is inversely proportional to variance & vice
websp	Jackle by either increasing a) complexity of model
-Abok	· Jackle by either increasing a) complexity of model  b) I raining Dataset
	A contested by the day of the days of the
*	everlitting
probe	· statistical model fits against its matching data.
	· statistical model fits against its matching data.
	· algo/model can't perform well on unseen data
	· model -> complex enough -> match all datapoint & performs well
	· model -> complex enough -> match all datapoint & performs well · Reasons -> noisy data, training data is too small & large no of features.
	to avoid overliber - Cooss validation. Joain with moredata
	To avoid overlitting -> · Gooss validation · Joain with moledata  Removing features · Carry stopping the training
	Fo avoid Overfitting > Goods validation Journal to Journal of the training . Removing features · Carry stopping the training . Removing features · Carry stopping the training . Regularization · Ensembling.

almonitor than seems Underfitting · Data model is unable to captuse rel b/w input & output occurs when model's too simple High bias low valiance larger quantity of featules · les data -> for model · to avoid udespitting by growing education time of model By indeasing wide warrely of functions. Learning Representation from data. · Key Process in ML&DL Involves extracting features or representations from saw data. enables algo to understand & present process complex patterns. · Representation learning essential for task like image & speech recognit · Deep learning excels in automatically learning representations from whole · Captures pherarchical & Nostract features the data. · enables transfer tearning, leveriging representations learned fromonetal · continuously evolving field with againg repeated in optimizations

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N	How deep learning works in three figures -
4	How midsty days of manager to
	Bousic Architectule of a Newfal Network.
	Fig1 - Browsic Architecture of a Newfal Network.  1) Input layer -> van data or features
	2) Hidden layers process -> input through output interconnected neurons.
	3) each remon applies a weighted sum & activation function.
	4) output layer -> predictions or classifications.
	I amendary I would alway of
	Fig2 - Convolutional Newal Network (CNN) for Image Recognition.
	) Input layer -> pixel values of an image.
	2) convolutional layers apply filters to extract features.
	3) Pooling layes reduce spatial dimensions, imp features.
	Enth connected layers interpret features for Anal classification.
	4) Fully connected layers interpret features for final classification. 5) Utilizes local connectivity & weight sharing for efficiency.
	5) Offices both toward, if g transfer states 400 g. a.s.
	- 3 A STATE OF THE POST OF THE
	Fig3- Recurrent Newal Newsork (RNN) for Sequential Data Processing.
	anout segues is feel seguestially into nework.
	2) Recurrent connections allow information to persist over fine.
	3) Hidden state capture content from previous 1 pm
	4) Only to reated at each time step or at and of sequele
	5) suitable for tasks involving sequices like language modeling or
	time socies prediction.
	support convolutionally received transcribes
	· betracted with donaflow, corres, theman
	. Vsed in research, wheaton a good development.

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*	Common Architectual Principale of Deep Netwo	sks -	T. All		
	6 Presentere	1	7111111		
	> Parameters => Loss frehions > Layers > ophimization methods	A 1 78 M			
	> Activation Function > Superparameters.	A CHAZON	749		
0	-> Activation Function -> Superparameters.	they turn			
200 903	when means is light Heavy control interconnected in	J. ruhhill	(2)		
A	Hechstechuse Design-	hust done	(6.77)		
		Harris	(1)		
	> Depth vs widh > Interpretability				
	> Fleniborlity > Scalability	Indama)	- SAA		
	> Efficiency   Regularization Technique	ull 1			
	> Haldware Consideration > Continuous Innovation-	towned 6			
T.	a layer robus spatial transfers, in partons.	silone o			
4	Popular Industry tools-	other C			
*	reputed victory of the	State C			
	La cas Places appearance la consciuole hu Congole Brash	n-Teams			
- 524 2	· Tenserflow - · open source framework by Groogle Brain	deva	0 ./*		
D	used for deep learning model built	aura	CIN		
	• ecosystem - Jensoflow lite, TFX, Je	100	6		
	· ecosystem -> Jensorlow lite; 1+x, Je	nsoyiow.	٢		
	applied in imy recognition, NLP, rei	inforcema	2=		
	apply windstall of certificities stop of at and of sequence	00 (H			
20	· Keras - · High level neural networks API in Python	ug - ( 2011)	Pristalling		
	· simplifies model building with minimal co	nde	1-11/19		
· supports convolutional & recurrent networks.					
	· Integrates with Jasoflow, CNTK, theano.				
	· Used in research, education & rapid develops	noal-			
	July out to the	. 000			

Pytorch -· open source framework by Framework AI Research-· Known for dynamic computation graph-· Provides flexibility & GiPV acceleration. · Integrates seamlessly with Python-· Used in research, academia, image classification-· Developed by Berkeley AI Research (BAIR) · Primarbly for CNNs & computer vision · Optimized for speed & efficiency. Offers pre-trained medels in Model Zoo. a Applied for in object recognition, face recognitionopen source Me library for valious algorithms. Shogun -· Supports supervised, unsupervised, kennel · Flerible, scalable & interoperable. · Modular design for combining algorithms. Used in research, education, classification, regression. Juditing -1) buthalization ( start with saudom well to of this) tobesand parts ( calculate weight sum of ingut > habited compet 3) other (aleutotren (computed gredicted output with orbidly color A) Each phagagation ( use exast a alfust receives & bias - aches 5) Repeat (1840 eat step 2-4 for all braining unit overable

. Middle layer -> leave about his or make land -> glades proce