CHALMERS
EXAMINATION / TENTAMEN

Course code/kurskod	Course name/kursnamn			
DIT821	S.E. AI System			
Anonymous code Anonym kod	0007-KDE	Examination date Tentamensdatum	Number of pages Antal blad	Grade Betyg
DIT821-0007-KDE		15.08.2023	8	VG

* I confirm that I've no mobile or other similar electronic equipment available during the examination.
Jag intygar att jag inte har mobiltelefon eller annan liknande elektronisk utrustning tillgänglig under eximinationen.

Solved task Behandlade uppgifter No/nr		Points per task Poäng på uppgiften	Observe: Areas with bold contour are to completed by the teacher. Anmärkning: Rutor inom bred kontur ifylles av lärare.
1	X	3	
2	X	5	
3	X	4,5	
4	X	4,5	
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
Bonus poäng	1	17	
Total examination points Summa poäng på tentamen		18	

[redacted]

1- @ under fitting: the probem is when the model is simple and basic so the soulition doesn't fit the data

b) over fitting: the probem is when the model is complex so it sensitive for any small changes. ✓ (1)

b) Regularization help to address the overfitting problem by adding penalty to the complex model during data training and make it balance. For example L2 Regularization. (1)

c) gradient descent works with complex model and alot of data.

Normal equation: works with simple model and less data. — (0)

gradient descent. Solve Complex prolem very well

normal equation: complex problem can cost alot ⇒

c)

Performance:

gradient descent: it is slower because it do small steps before finsh

Normall equation: it is faster and give the result quicker.

Depends on number of data pts

Result:

gradient descent: give better result with complex tasks

normal equation: it is give better result with simple tasks. (1)

d) Yes, In this case I prefer gradient descent because it is abt of features (big size of features) incomplete 0,5

e) a) False, because if the leaning rate is very large it can make ~~overshooting~~ Overshooting ~~which~~ which can ~~cose~~ increase of value. ✓ (0,5)

b) ~~in~~ true, because we have $\theta_0 = \theta_1$ so, they will stay equal. ~ (1)

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@ $w_0 = 6$, $w_1 = -5$, $w_2 = 1$

$y = g(w_0 + w_1 x + w_2 x^2)$

$g(h(x)) \geq 0.5$

$h(x) \geq 0$

$6 - 5x + x^2 = 0$

$5x - x^2 = 6$ (1)

b) $y_1 = 0$

$y_2 = 2$

$y_3 = 0$ (1)

c) The k-mean parameter is the number of clusters and this parameter determin how many clusters centroids will created by k-mean algorithm when start. (1)

d) the second Step is to assign each data points to closer clusters centroids

the third Step is to update cluster centroids by mean of distanse between each data point position and clusters centroid belong to. and go throw each cluster and calculate the means and updat centroid (1)

e) cost function is the sum of Square distance between all data point position and clusters centroids? belong to. the k mean make it well formed cost function. (1)

@- Feature handling:

traditional ML: Its need manual feature engineer to handel features manual.

-Deep ML: doesn't requred manual because everythings automatic handel. ✓

- Data scaly.

traditional ML: work well with smaller dataset.

Deep ML: work well with big data set. ✓

- ~~performace~~ -Qaluity and performanc -

traditional ML: works better with simple task needs less data during traing data.

Deep ML: work better with complex task needs more datad during trainig data.

imprise, also can work well on simple tasks (with many data) still ?

b) non-linearity: is serves to capture complex pattents which Linear cant capture it.

$F(X) = X^2$ ✓ (1)

c) Kernel size is ~~deterin~~ decide the quality of ~~maps function~~ produse functions

Less Kernel Size more capture of details ~~less complex maps function~~ ✓ (1)

d) the functionality of the pooling layer is to reduce the size of complex maps function and keep other maps fnnction. (1)

e) vanishing gradient prolem is happen when the network struggle of Learning because of abt ~~of Longout~~ Layer (deep). unclear

Recurrent neural networks help to solue this isuee because it hos memory to remnber each step so it solue this Learning issue. Too brief (0,5)

a) probem happen during data collection is

Erorr data Entering : this can happen

when entering invaild data value. ✓

Probem happen After data collection

Is : Overtime data (Decay):

this probem happen when data became

old and not vaild Like phone number

emails...etc. ✓ (1)

b) yes, because ML Algorithm deal with

mathmatic numbers.

one-hot fix the probelm by convert

categorical data into binary numbers

(0,1) wich can be reads by

ML Algorithm.

(1)

c) the formula used to evaluate the accurate of task like object detection the box refers to annotated data

the score is bettwenin (0,1) when it is closer to(1) is the best result. (1)

D) yes its always applicable because Any model requirements ~~always~~ need Something to evaluate the result. which evaluation metrics do. but they're not the only way

Example: we create model requirements to catch all spam emails and after we add metrics to evaluate if the result is equal to the spam mails catched. (0,5)