FIT 3181/5215 Deep Learning

Quiz for:

Introduction to Machine Learning

Tutor Team

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Content

The quizzes cover the material in Lecture 01 and Tutorial 02 which include:

- Machine learning pipeline
- Evaluation metric: precision, recall, F1-score

Question 1

Consider the problem of predicting the house price in Melbourne. Which of the following statements are most likely true (MC).

- A. This problem should be approached from a supervised learning problem
- B. This problem is better to be addressed as a classification problem
- C. This problem is better to be addressed as a regression problem
- D. We should adopt abnormality detection methods for this prediction problem

Question 1

Consider the problem of predicting the house price in Melbourne. Which of the following statements are most likely true (MC).

- A. This problem should be approached from a supervised learning problem **[x]**
- B. This problem is better to be addressed as a classification problem
- C. This problem is better to be addressed as a regression problem **[x]**
- D. We should adopt abnormality detection methods for this prediction problem

Question 2

John class has 50 students. He wants to build a machine learning model which helps to recognize students' face and automatically records their attendance in his class. He lists some must-do tasks as below. Choose the correct pipeline? (SC)

(1) *Taking students' pictures and upload to internet*	(2) *Building a machine learning model*
(3) *Grouping student's pictures and their ID number (e.g. student ID 01: image A, B; student ID 02: image C, D, etc)*	(4) *Collecting student's ID number*
(5) *Splitting dataset into training set, testing set*	(6) *Download face images from internet*
(7) *Filtering, removing low quality images*	(8) *Training model on training set;*
(9) *Testing model on testing set*	(10) *Deploying model into a real hardware system*

- A. (1) (6) (3) (4) (7) (5) (2) (8) (9) (10)
- B. (1) (6) (7) (4) (3) (2) (5) (8) (10) (9)
- C. (1) (6) (7) (4) (3) (5) (2) (8) (9) (10)
- D. (1) (6) (3) (4) (7) (5) (2) (8) (10) (9)

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- C. (1) (6) (7) (4) (3) (5) (2) (8) (9) (10) **[x]**
- D. (1) (6) (3) (4) (7) (5) (2) (8) (10) (9)

Question 3

John's class has 50 students. He wants to build a machine learning model which helps to recognize students' face and automatically records their attendance in his class. John splits his students' images into two sets: training set and testing set. John ***trains*** *three models A, B, C on* ***training set*** *and choose the model with the* ***highest accuracy*** *on* ***training set*** *as the final model. Which are correct statements? (SC)*

- A. Join's model will be possibly experiencing an overfitting problem
- B. Join's model will be possibly experiencing a dataset biasing problem
- C. The dataset was used wrongly
- D. None of above

Question 3

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- A. Join's model will be possibly experiencing an overfitting problem **[x]**
- B. Join's model will be possibly experiencing a dataset biasing problem
- C. The dataset was used wrongly
- D. None of above

Question 4

John wants to build a machine learning model which helps to recognize a strange student attending his class? The confusion table is as below. Choose the correct statement? (MC)

Predicted as \ True labels	Stranger	John's student
Stranger	2	5
John's student	3	40

- A. John's class has total 50 students
- B. John's model accuracy (2+40) / (2+3+5+40) = 84%
- C. John model's recall 2 / 5 = 40%
- D. John model's precision 2/7

Question 4

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- A. John's class has total 50 students
- B. John's model accuracy (2+40) / (2+3+5+40) = 84% **[x]**
- C. John model's recall 2 / 5 = 40% **[x]**
- D. John model's precision 2/7 **[x]**

Question 5

John wants to build 2 models A, B which helps to recognize a strange student attending his class? The confusion as the tables below. Choose the correct statement? (SC)

Model A

True labels

Predicted as	Stranger	John's student
Stranger	4	7
John's student	1	88

Model B

True labels

Predicted as	Stranger	John's student
Stranger	2	3
John's student	3	92

- A. Model A is better than model B in prediction accuracy
- B. Model A is better than model B in recall
- C. Model A is better than model B in true negative rate
- D. Model A is better than model B in precision

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John wants to build 2 models A, B which helps to recognize a strange student attending his class? The confusion as the tables below. Choose the correct statement? (SC)

Model A

Predicted as	True labels: Stranger	True labels: John's student
Stranger	4	7
John's student	1	88

Model B

Predicted as	True labels: Stranger	True labels: John's student
Stranger	2	3
John's student	3	92

- A. Model A is better than model B in prediction accuracy
- B. Model A is better than model B in recall **[x]**
- C. Model A is better than model B in true negative rate
- D. Model A is better than model B in precision

Question 6

- *Our dataset has 10 spam emails (label 1) and 50 non-spam emails (label -1). Given an email x, the classifier returns $p(x) = P(y = 1|x)$ as the probability to assign x to the class 1. The classifier assigns x to the class 1 if $p(x) \geq 0$. Choose the correct statements.* (MC)

  - A. Recall = 1
  - B. Precision = 1/6
  - C. True Positive Rate = 0
  - D. False Positive Rate = 1

Question 6

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- A. Recall = 1 **[x]**
- B. Precision = 1/6 **[x]**
- C. True Positive Rate = 0
- D. False Positive Rate = 1 **[x]**

		Actual
	SPAM (1)	NON-SPAM (-1)
Predicted		
SPAM (1)	10	50
NON-SPAM (-1)	0	0

Question 7

- *Our dataset has 10 spam emails (label 1) and 50 non-spam emails (label -1). Given an email x, the classifier returns $p(x) = P(y = 1|x)$ as the probability to assign x to the class 1. The classifier assigns x to the class -1 if $p(x) \leq 1$. Choose the correct statements.* (MC)

  - A. Recall = 0
  - B. Accuracy = 5/6
  - C. True Positive Rate = 0
  - D. False Positive Rate =1

Question 7

- *Our dataset has 10 spam emails (label 1) and 50 non-spam emails (label -1). Given an email x, the classifier returns $p(x) = P(y = 1|x)$ as the probability to assign x to the class 1. The classifier assigns x to the class -1 if $p(x) \leq 1$. Choose the correct statements.* (MC)

- A. Recall = 0 **[x]**
- B. Accuracy = 5/6 **[x]**
- C. True Positive Rate = 0 **[x]**
- D. False Positive Rate = 1

		Actual	
		SPAM (1)	NON-SPAM (-1)
Predicted	SPAM (1)	0	0
	NON-SPAM (-1)	10	50

Question 8

Referring to the segment of codes below, what is the number of data points return to variable train_X if there are 200 data points in X? (SC)

```
from sklearn.model_selection import train_test_split
train_X, test_X, train_y, test_y = train_test_split(X, y, test_size = 0.3, random_state=2)
```

- A.60
- B. 70
- C. 140
- D. 200

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- A.60
- B. 70
- C. 140 **[x]**
- D. 200

Question 9

Choose the possible solution If a model performs great on the training data but generalizes poorly to new instance. (MC)

- A. Selecting a more complicated algorithm, increasing the number of parameters
- B. Reducing the number of input features
- C. Increasing the amount of training data
- D. Increasing testing set and reducing training set

Question 9

Choose the possible solution If a model performs great on the training data but generalizes poorly to new instance. (MC)

- A. Selecting a more complicated algorithm, increasing the number of parameters
- B. Reducing the number of input features **[x]**
- C. Increasing the amount of training data **[x]**
- D. Increasing testing set and reducing training set

Question 10

- *Assume that we have 4 classes in {cat = 1,dog = 2,lion = 3, monkey = 4}. What is one-hot label of categorical label "**lion**"?*

- A. [1,0,0,0]
- B. [0,1,0,0]
- C. [0,0,1,0]
- D. [0,0,0,1]

Question 10

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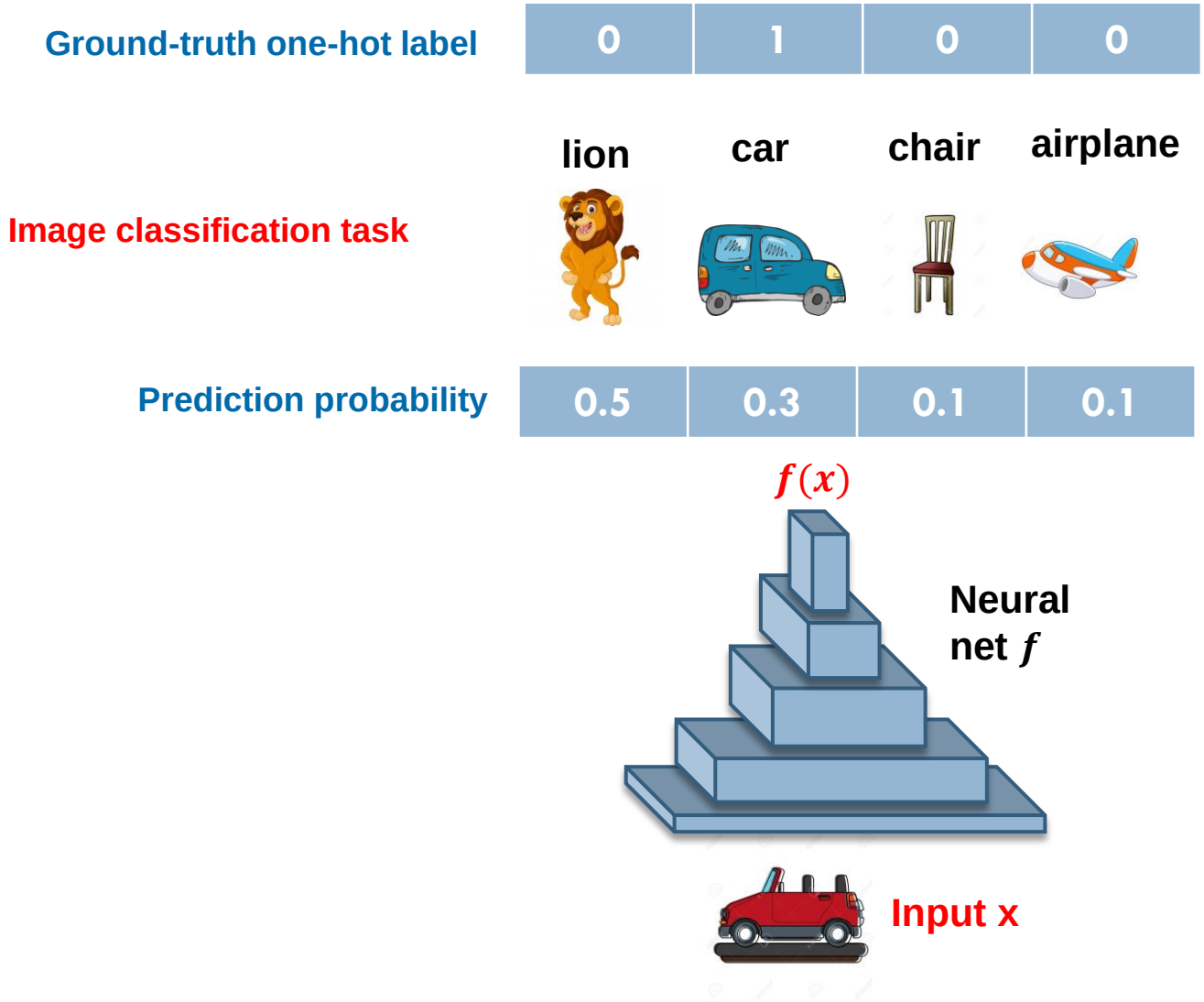
- B. [0,1,0,0]
- C. [0,0,1,0] **[x]**
- D. [0,0,0,1]

Question 11

- *Consider an image classification task as showing. Assume that the model give a* ***prediction probabilities*** $f(x) = [0.5, 0.3, 0.1, 0.1]$ *and* ***categorial ground-truth label*** *of* x *is car. What is the cross-entropy loss suffered by this prediction?*

- A. $-\log 0.5$
- B. $\log 0.3$
- C. $-\log 0.3$
- D. $\log 0.5 + \log 0.1$



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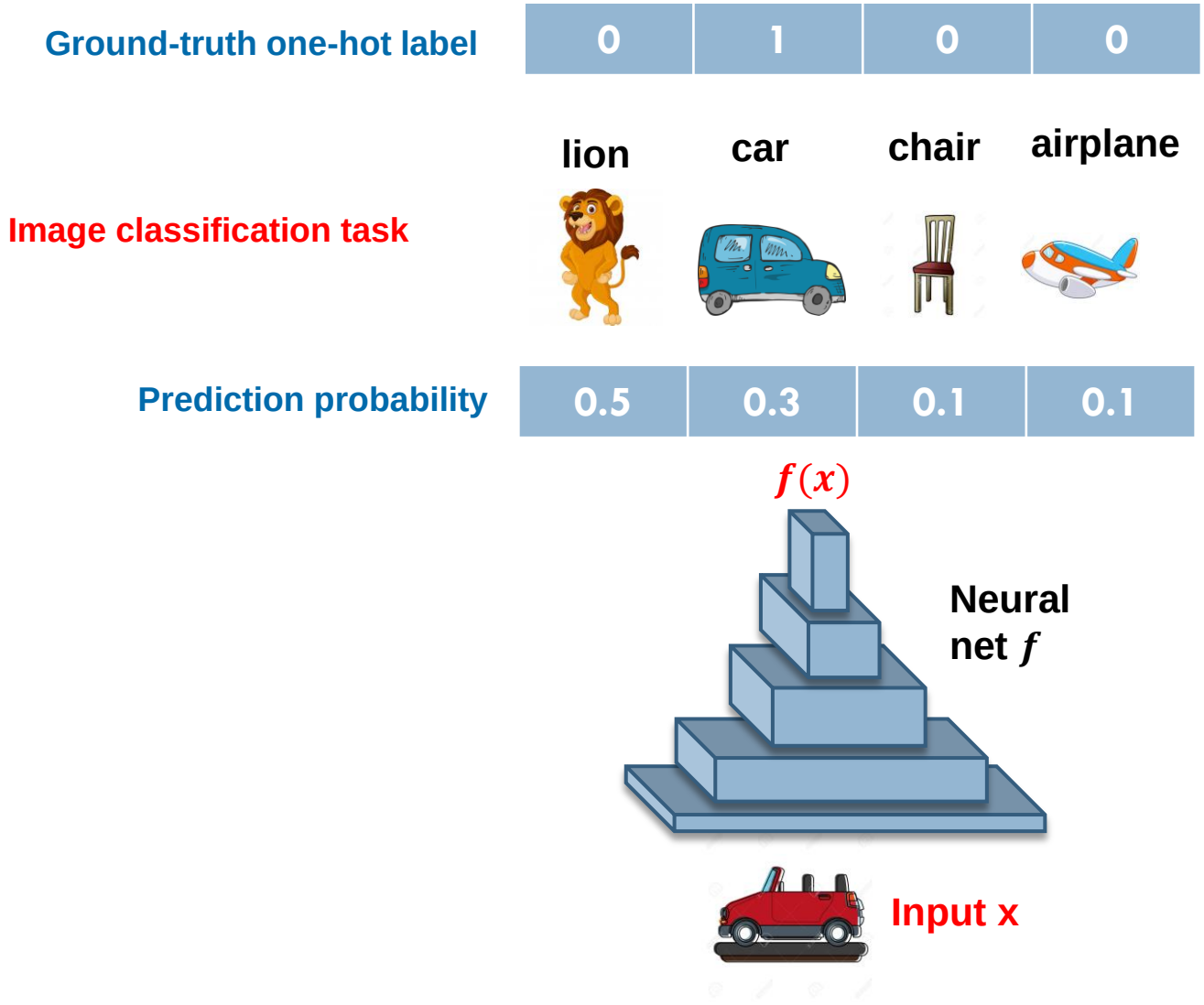

Question 12

- *Assume that we have **4 classes** in **{cat = 1,dog = 2,lion = 3, monkey = 4}**. Given a data example x with **ground-truth label "dog"**, assume that a machine learning model gives **discriminative scores** to this x as $h_1 = -3$, $h_2 = 10$, $h_3 = 5$, $h_4 = 0$. Choose all correct answers. (MC)*

- A. The model predicts x as lion
- B. The model predicts x as dog
- C. This is a correct prediction
- D. This is an incorrect prediction

Question 12

- *Assume that we have **4 classes** in **{cat = 1,dog = 2,lion = 3, monkey = 4}**. Given a data example x with **ground-truth label "dog"**, assume that a machine learning model gives **discriminative scores** to this x as $h_1 = -3$, $h_2 = 10$, $h_3 = 5$, $h_4 = 0$. Choose all correct answers. (MC)*

- A. The model predicts x as lion
- B. The model predicts x as dog **[x]**
- C. This is a correct prediction **[x]**
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Question 13

- *Assume that we have **4 classes** in **{cat = 1,dog = 2,lion = 3, monkey = 4}**. Given a data example x with **ground-truth label "dog"**, assume that a machine learning model gives **discriminative scores** to this x as $h_1 = -3$, $h_2 = 10$, $h_3 = 5$, $h_4 = 0$. What is the probability to predict x as lion or $p(y = lion \mid x)$?*

- A. $\frac{e^5}{e^{-3}+e^{10}+e^5+e^0}$
- B. 1
- C. $\frac{e^0}{e^{-3}+e^{10}+e^5+e^0}$
- D. $\frac{e^{10}}{e^{-3}+e^{10}+e^5+e^0}$

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- A. $\frac{e^5}{e^{-3}+e^{10}+e^5+e^0}$ **[x]**
- B. 1
- C. $\frac{e^0}{e^{-3}+e^{10}+e^5+e^0}$
- D. $\frac{e^{10}}{e^{-3}+e^{10}+e^5+e^0}$

Question 14

- *Assume that we have **4 classes** in **{cat = 1,dog = 2,lion = 3, monkey = 4}**. Given a data example x with **ground-truth label "cat"**, assume that a machine learning model gives **discriminative scores** to this x as $h_1 = -3$, $h_2 = 10$, $h_3 = 5$, $h_4 = 0$. What is the CE loss suffered by this prediction?*

- A. $\log \frac{e^5}{e^{-3}+e^{10}+e^5+e^0}$
- B. $\log \frac{e^{-3}}{e^{-3}+e^{10}+e^5+e^0}$
- C. $-\log \frac{e^{-3}}{e^{-3}+e^{10}+e^5+e^0}$
- D. $-\log \frac{e^{10}}{e^{-3}+e^{10}+e^5+e^0}$

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- A. $\log \frac{e^5}{e^{-3}+e^{10}+e^5+e^0}$
- B. $\log \frac{e^{-3}}{e^{-3}+e^{10}+e^5+e^0}$
- C. $-\log \frac{e^{-3}}{e^{-3}+e^{10}+e^5+e^0}$ **[x]**
- D. $-\log \frac{e^{10}}{e^{-3}+e^{10}+e^5+e^0}$