ⓘ 此測驗已重新評分；您的新分數反映了受影響的 2 個問題。

此測驗已鎖定，學生無法作答。

HW09

截止時間 5月28日 23:59 **分數** 10 **問題** 30
接受繳交時間 5月10日 15:59 - 5月28日 23:59 18 天 **時間限制** 無
可作答次數 無限制

說明

[Note] **You won't be able to view your choices after submission each time!**

HW Slide:
https://docs.google.com/presentation/d/13xUwWArz0LROgyJBwGCf1Vili5u7l4K6WcyuRxxak
usp=sharing
(https://docs.google.com/presentation/d/13xUwWArz0LROgyJBwGCf1Vili5u7l4K6WcyuRxxakAo/edit?usp=sharing)

Code: https://colab.research.google.com/drive/1HUrq-_90WgLJm1pD1mRLETo2YoFMCwrO?usp=sharing
(https://colab.research.google.com/drive/1HUrq-_90WgLJm1pD1mRLETo2YoFMCwrO?usp=sharing)

If you have any questions, you can ask via...

- NTU COOL (recommended)
  - https://cool.ntu.edu.tw/courses/4793
- Email
  - ntu-ml-2021spring-ta@googlegroups.com
  - The title **must** begin with “[hw9]”
- TA hours
  - Each Monday 19:00~21:00 ~~@Room 101, EE2 (電機二館101)~~ Online
    (https://meet.google.com/jij-bnxu-vgc)
  - Each Friday 13:30~14:20 Before Class ~~@Lecture Hall (綜合大講堂)~~ Online
    (https://meet.google.com/jij-bnxu-vgc)
- ~~Each Friday During Class~~

此測驗鎖定於 5月28日 23:59。

作答記錄

	作答記錄	時間	分數	已重新評分
保留的	作答紀錄 4	4，468 分鐘	得分：9.25；總分：10	得分：9.7；總分：10
最新的	作答紀錄 4	4，468 分鐘	得分：9.25；總分：10	得分：9.7；總分：10
	作答紀錄 3	9 分鐘	得分：9；總分：10	得分：9.6；總分：10
	作答紀錄 2	2，491 分鐘	得分：8.87；總分：10	得分：9.47；總分：10
	作答紀錄 1	3，340 分鐘	得分：7.49；總分：10	得分：8.09；總分：10

此作答紀錄的分數： 得分：**9.7**；總分：10
已提交5月28日 0:06
此作答持續 4，468 分鐘。

問題 1

0.3 / 0.3 分

請觀察圖片編號 6 使用 Lime 套件的結果應該為何？

Please observe the picture number 6. What should be the result of using the Lime package?

正確！

- (●) 綠色集中在圖片中食物部分 Green is concentrated in the food part of the picture
- ( ) 紅色集中在圖片中食物部分 Red is concentrated in the food part of the picture
- ( ) 綠色集中在圖片中盤子部分 Green is concentrated on the plate part in the picture

紅色集中在圖片中盤子部分 Red is concentrated on the plate part in the picture

問題 2

0.3 / 0.3 分

請觀察圖片編號 1 使用 Lime 套件的結果，何者正確？

Please observe the result of using the Lime package for picture number 1, which is correct?

輪廓對於 model 來說完全是正相關的依據 The contour is completely positively related to the model

輪廓對於 model 來說完全是負相關的依據 The contour is completely negatively related to the model

正確！

有一部份輪廓對於 model 來說是正相關，有些則是負相關 Some contours are positively correlated to the model, and some are negatively correlated

輪廓不是 model 的判斷依據 The contour is not the basis for the judgment of the model

問題 3

0.3 / 0.3 分

請問 Lime 套件的顏色代表什麼意義？（選兩個選項）

What does the color of the Lime package mean? (Choose two options)

正確！

- [x] 綠色代表正相關 Green means positive correlation
- [ ] 綠色代表負相關 Green represents negative correlation
- [ ] 紅色代表正相關 Red means positive correlation

正確！

- [x] 紅色代表負相關 Red represents negative correlation

問題 4

0.3 / 0.3 分

請觀察圖片編號 4，包含了右側的褐色肉排與左側的黃色穀物，使用 Lime 套件之後的結果顯示這兩個部分怎麼影響 model 做出分類？

Please observe the picture number 4, which contains the brown steak on the right and the yellow grain on the left. The result after using the Lime kit shows how these two parts affect the classification of the model?

正確！

- (•) 右側的褐色肉排為主要的正相關 The brown steak on the right is the main positive correlation
- ( ) 左側的黃色穀物為主要的正相關 The yellow grain on the left is the main positive correlation
- ( )

右側的褐色肉排為主要的負相關 The brown steak on the right is the main negative correlation

左側的黃色穀物為主要的負相關 The yellow grain on the left is the main negative correlation

問題 5

0.3 / 0.3 分

請問 Saliency Map 是將下列何者具象化？

Which of the following does Saliency Map visualize ?

loss 對 model parameter 的偏微分值

The partial differential value of loss to model parameter

$\frac{\partial Loss}{\partial Model\ Param}$

正確！

loss 對 input tensor 的偏微分值

The partial differential value of loss to input tensor

$\frac{\partial Loss}{\partial Input\ Tensor}$

model parameter 對 loss 的偏微分值

The partial differential value of model parameter to loss

$\frac{\partial Model\ Parameter}{\partial Loss}$

input tensor 對 loss 的偏微分值

The partial differential value of input tensor to loss

$\frac{\partial Input\ tensor}{\partial Loss}$

input tensor 對 label 的偏微分值

The partial differential value of input tensor to label

$\frac{\partial Input\ tensor}{\partial Label}$

問題 6

0.3 / 0.3 分

請問在畫 Saliency Map 時，為何要對每張圖片的 gradient 做 normalize ?

When drawing the Saliency Map, why do we need to normalize each image’s gradient?

不做也沒有關係

It doesn't matter if we don't do it

正確！

降低不同圖片 gradient scale 不同的影響

Reduce the effect of gradient scale in different pictures

增加不同圖片 gradient scale 不同的影響

Increase the different effects of gradient scale in different pictures

讓 saliency 分佈更加均勻

Make saliency distribution more even

讓 saliency 分佈更為顯著

Make the saliency distribution more significant

問題 7

0.3 / 0.3 分

請問圖片編號 0 的 saliency map 中，紅點分佈的情況最像下列哪一種？

In the saliency map of picture number 0, which of the following is the most similar to the red dot distribution?

正確！

立方體

Cube

圓球體

Round sphere

圓柱體

Cylinder

角錐體

Pyramid

四面體

Tetrahedron

問題 8

0.3 / 0.3 分

圖片編號 1 的 saliency map 中，紅點分佈成壺狀，請問「把手」的位置靠近圖片的哪一邊？

In the saliency map of picture number 1090, the red dots are distributed in a pot shape. Which side of the picture is the "handle" close to?

上方

Above

下方

Below

左方

Left

正確！

右方

Right

中間

Intermediate

問題 9

原始分數： 0 / 0.3 分 重新評分的分數： 0.3 / 0.3 分

ⓘ 此問題已經被重新評分。

請問圖片編號 2 的 saliency map 中，紅點分佈的情況最接近下列何者？

In the saliency map of picture number 2, which of the following is closest to the distribution of red dots?

明顯分佈於圖片中蛋糕的位置

Obviously distributed in the position of the cake in the picture

明顯分佈於圖片中盤子的位置

Distributed clearly in the position of the plate in the picture

明顯分佈於圖片中手機的位置

Obviously distributed in the location of the phone in the picture

正確！

沒有明顯分佈於圖片中的特定位置

Not clearly distributed in a specific location in the picture

問題 10

0.3 / 0.3 分

請問 Smooth grad 是藉由什麼方式解釋 model 的判斷？

How does Smooth grad explain the model's judgment?

隨機加入 noise 觀察 model 的輸出結果改變

Randomly add noise to observe the changes in the output of the model

正確！

隨機加入 noise 觀察 model 的產生的 saliency map

Randomly add noise to observe the saliency map generated by the model

平均多張圖片的結果以觀察 model 的輸出

Average the results of multiple pictures to observe the output of the model

平均多張圖片的結果以觀察 model 的產生的 saliency map

Average the results of multiple pictures to observe the significance map generated by the model

問題 11

0.3 / 0.3 分

請比較 saliency map 與 smooth grad 產生的結果，下列何者正確？

Please compare the results produced by the saliency map and smooth grad. Which of the following is correct?

- 圖片編號 0 的 saliency map 與 smooth grad 強調的位置不同

  The saliency map of picture number 0 is different from the prominent position of smooth grad

- 圖片編號 2 的 saliency map 與 smooth grad 強調的位置相同

  The salient picture of picture number 2 is the same as the protruding position of smooth grad

- 整體來說，saliency mape 強調的部分更接近圖片中食物的位置

  Overall, the saliency mape's highlighted part is closer to the position of the food in the picture

正確！

- 整體來說，smooth grad 強調的部分更接近圖片中食物的位置

  Overall, the highlighted part of smooth grad is closer to the position of the food in the picture

問題 12

0.3 / 0.3 分

請觀察圖片編號 9 的 smooth grad 結果，下列何者正確？

Please observe the Smooth grad result of picture number 9. Which of the following is correct?

正確！

亮點主要為湯碗的輪廓

- [x] The highlight is mainly the outline of the soup bowl

亮點主要為碗中的湯

- [ ] The highlight is mainly the soup in the bowl

亮點主要為湯裡面的蔥花

- [ ] The highlight is mainly the chopped green onion in the soup

- [ ]

亮點主要包含整碗湯（包括碗與內容物）

Highlights mainly include the whole bowl of soup (including bowl and contents)

問題 13

0.3 / 0.3 分

請問在 smooth grad 計算完成後，沒有使用 normalize 會造成什麼樣的結果？

After the smooth grad calculation is completed, what will happen if normalize is not used?

與有使用 normalize 結果一樣

- [ ] The same as the result of using normalize

食物的輪廓更加清楚

The outline of the food is clearer

產生亮點的區域不同

The areas where the bright spots are generated are different

正確！

無法觀察到亮點部位

Cannot observe bright spots

亮點變暗，暗點變亮

Bright spots darken, dark spots brighten

問題 14

0.3 / 0.3 分

請問我們觀察 cnnid=6 的 filter visualization，是觀察 model 的哪一種 layer 的輸出？

When we observe the filter visualization with cnnid=6, what kind of layer output of the model are we observing?

正確！

Conv2d()

BatchNorm2d()

ReLU()

MaxPool2d()

Linear()

問題 15

0.15 / 0.3 分

請觀察較靠近輸出端的 cnn layer 的 filter activation，與較靠近輸入端的 cnn layer 的 filter activation 有什麼樣的差異？（選兩個）

Please observe the difference between the filter activation of the cnn layer closer to the output and the filter activation of the cnn layer closer to the input? (Choose two)

較為清晰

Relatively clear

正確答案

較為模糊

More vague

正確！

activate 的位置大致相似

The position of activate is roughly similar

activate 的位置幾乎不同

The location of activate is almost different

問題 16

原始分數： 0 / 0.3 分 重新評分的分數： 0.3 / 0.3 分

ⓘ 此問題已經被重新評分。

請觀察圖片編號 1 在 cnnid=15, filterid=0 的 filter activation 的結果，請問圖片的哪部分最能 activate 這個 filter?

Please observe the result of filter activation with picture number 1 at cnnid=15, filterid=0. Which part of the picture can activate the filter most?

牛奶

milk

背景

background

正確！

外圍輪廓

Outer contour

問題 17

0.3 / 0.3 分

Filter explanation 中我們觀察了哪些情況？（選兩個）

What have we observed in Filter explanation? (Choose two)

正確！

圖片的哪些部位會 activate 特定的 filter

Which parts of the picture will activate a specific filter

哪一層 filter 對判斷食物種類最有幫助

Which level of filter is most helpful for judging the type of food

正確！

什麼樣的圖片最容易 activate 特定的 filter

What kind of picture is the easiest to activate a specific filter

哪一層 filter 最容易被特定的圖片 activate

Which layer of filter is most likely to be activated by a specific image

問題 18

0.3 / 0.3 分

請觀察圖片編號 7 Integrated Gradient 的結果，請問 model 判斷的依據可能是哪些 pixels ? Please observe the result of picture number 7 in Integrated Gradient. What pixels may be the basis for model judgment?

- 裝肉的鐵盤
  Meat plate
- 肉排的輪廓
  Outline of the steak
- 肉排本身
  Steak itself

正確！

問題 19

0.3 / 0.3 分

請觀察在使用 Integrated Gradient 方法時把 generate_images_on_linear_path 的 steps 調的更大會產生什麼差異 ?

Please observe what difference will be made if the steps of generate_images_on_linear_path is tuned larger when using the Integrated Gradient method?

正確！

沒有顯著的差異

No significant difference

亮點變暗，暗點變亮

Bright spots darken, dark spots brighten

觀察不到亮點

No bright spots are observed

亮點隨機出現

Bright spots appear randomly

問題 20

0.3 / 0.3 分

請問 Integrated Gradient 中 generate_images_on_linear_path 這個 function 的作用為何？

What is the function of the function: generate_images_on_linear_path in Integrated Gradient?

根據原圖片產生新的一群隨機圖片

Generate a new group of random pictures based on the original picture

正確！

在原圖片與 baseline 之間產生連續的 samples

Generate continuous samples between the original picture and the baseline

根據原圖片產生一張 baseline 的圖片

Generate a baseline picture based on the original picture

把原圖片線性平移產生一張新圖片

Linearly translate the original picture to generate a new picture

問題 21

0.4 / 0.4 分

請使用網站 https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) 及模型「bert-based-cased」分析以下句子:

The students visited the professor and asked her to teach them machine learning.

Visualize the sentence “The students visited the professor and asked her to teach them machine learning.” in https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) using the model “bert-based-cased”

對於模型中 12 層，每層中的第 12個 attention head (i.e. layer 1 head 12, layer 2 head 12, layer 3 head 12, …, layer 12 head 12), 下列哪一個功能可能存在? (可能有超過一個答案)

For attention head 12 across all 12 layers in the model (i.e. layer 1 head 12, layer 2 head 12, layer 3 head 12, …, layer 12 head 12), which of the following functionalities is most likely to exist? (may be more than one answer)

正確！

Attend to period (句號)

正確！

Attend to previous token

正確！

- [x] Attend to same token

正確！

- [x] Attend to next token

正確！

- [x] Attend to special token

問題 22

0.4 / 0.4 分

請使用網站 https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) 及模型「bert-based-cased」分析以下句子:

The students visited the professor and asked her to teach them machine learning.

Visualize the sentence “The students visited the professor and asked her to teach them machine learning.” in https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) using the model “bert-based-cased”

(1) 當句子中的「her」被蓋掉，模型在被蓋掉的地方預測哪一個字?

(1) Which token does the model predict in the masked position if “her” in the sentence is masked?

[選擇]

(2) 在句子中的「her」被蓋掉的情況下，如果把句子中的「professor」也蓋掉，在「her」的位置預測「him」的機率減少了多少?

(2) By how much does the probability of predicting “him” in the position of “her” decrease when “professor” is masked? (“her” is masked during the comparison)

[選擇]

回答 1：

正確！ him

回答 2：

正確！ 0.73

問題 23

0.4 / 0.4 分

請使用網站 https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) 及模型「bert-based-cased」分析以下句子:

The students visited the professor and asked her to teach them machine learning.

Visualize the sentence “The students visited the professor and asked her to teach them machine learning.” in https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) using the model “bert-based-cased”

在「professor」一字被蓋掉，換成 [MASK] token的情況下，搜尋「Wizrd of Oz」中與 [MASK] 最相似的 Embedding。請問模型從哪一層開始成功預測被蓋掉的字的詞性? (成功預測的定義是 50 個字中最常出現的詞性與被蓋掉的字詞性相同)

Mask the word “professor” and search in the corpus “Wizard of Oz” for embeddings most similar to the masked token “[MASK]”. After which layer does the model successfully predict part of speech of the masked word? (the definition of predict successfully is that the most frequent part of search among the 50 words is the same as the masked word)

- Layer 8
- Layer 9

正確！

- Layer 11
- Layer 12
- Layer 2
- Layer 7

問題 24

0.4 / 0.4 分

請使用網站 https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) 及模型「bert-based-cased」分析以下句子:

The students visited the professor and asked her to teach them machine learning.

Visualize the sentence “The students visited the professor and asked her to teach them machine learning.” in https://exbert.net/exBERT.html (https://exbert.net/exBERT.html) using the model “bert-based-cased”

下列哪一個 attention head 可能有指代消解的功能?

Which of the following attention heads may have the functionality of coreference resolution?

(指代消解的例子: 湯姆喜歡珍妮，因為她很可愛。她指的是珍妮)

(example of coreference resolution: Tom likes Jeanie because she is cute. She refers to Jeanie)

Layer 7 Head 3

Layer 8 Head 3

Layer 9 Head 3

正確！

Layer 10 Head 3

Layer 11 Head 3

問題 25

0.4 / 0.4 分

模型 1 中的哪幾層可能在負責「從文章中尋找與問題有關的資訊」？

For Model 1, which layers may perform the step “Matching question with relevant information in context”?

Layer 1 to 3

Layer 4 to 6

正確！

Layer 7 to 9

Layer 10 to 12

問題 26

0.4 / 0.4 分

模型 1 在哪一條問題答錯了?

Which question(s) does Model 1 answer incorrectly?

- Question 1
- Question 2
- Question 3
- Question 1 and Question 2
- Question 1 and Question 3
- Question 2 and Question 3
- All 3 Questions

正確！

問題 27

0.4 / 0.4 分

下列哪一個模型有微調在閱讀理解的任務上?

Which model(s) has been fine-tuned for Question Answering?

- Model 1
- Model 2
- Model 3
- Model 1 and Model 2
- Model 1 and Model 3

正確！

Model 2 and Model 3

All 3 Models

問題 28

0.4 / 0.4 分

這題的目標是要找出作業投影片中的圖片(也是老師上課投影片的圖片 (https://speech.ee.ntu.edu.tw/~hylee/ml/ml2021-course-data/bert_v8.pdf#page=34))是如何生成的。

The purpose of this question is to reproduce the picture in homework's slide (which is also the picture (https://speech.ee.ntu.edu.tw/~hylee/ml/ml2021-course-data/bert_v8.pdf#page=34) in professor's slide).

(1) 圖片使用的比較指標是?

(1) Which metric is used for comparison?

餘弦相似度 Cosine Similarity

(2) 圖片在比較哪一個字/詞的 Embedding?

(註: 正確的答案圖片的顏色會幾乎完全一樣)

(2) Which word / phrase is used for comparison?

(For correct answer, color of the image is nearly the same)

「果」字的 Embedding Embedding of 「果」only

回答 1：

正確！ 餘弦相似度 Cosine Similarity

回答 2：

正確！ 「果」字的 Embedding Embedding of 「果」only

問題 29

0.4 / 0.4 分

使用餘弦相似度或歐氏距離作比較的指標。

Use the metric “Cosine Similarity” or “Euclidean Distance” for comparison.

請比較句子「今天買了蘋果手機」及「蘋果的股價又跌了」中，兩個「蘋」字之間的相似度。請問 Embedding 從第1層到第11層(請忽略最後一層)，相似度的趨勢為何?

Compare the word embedding of 「蘋」in sentence 「今天買了蘋果手機」and word embedding of 「蘋」in sentence 「蘋果的股價又跌了」，what is the trend of similarity from embedding output to layer 11? (please exclude the last layer)

正確！

- (●) 先跌後升 Decrease, then increase
- ( ) 下跌 Decrease
- ( ) 上升 Increase

先升後跌 Increase, then decrease

問題 30

0.4 / 0.4 分

使用餘弦相似度或歐氏距離作比較的指標。

Use the metric “Cosine Similarity” or “Euclidean Distance” for comparison

請問在第0層 (input embedding)，不同句子中的「果」一字之間的相似度，與下列何者無關? (可能有超過一個答案)

Which of the following(s) does not affect the similarity of “果” between different sentences at the embedding output? (may be more than one answer)

正確！ 「果」在句子中的意思 Contextual meaning of “果” in sentences

正確！ 「果」所在句子的長度 Length of sentences

- [ ] 「果」在句子中的位置 Position of “果” in sentences
- [x] 「果」在句子中的出現次數 Occurence of “果” in sentences

正確！

測驗分數： 得分：**9.7**；總分：10

此測驗分數已手動調整 -0.15 分。