

機器學習 - NTUDAC

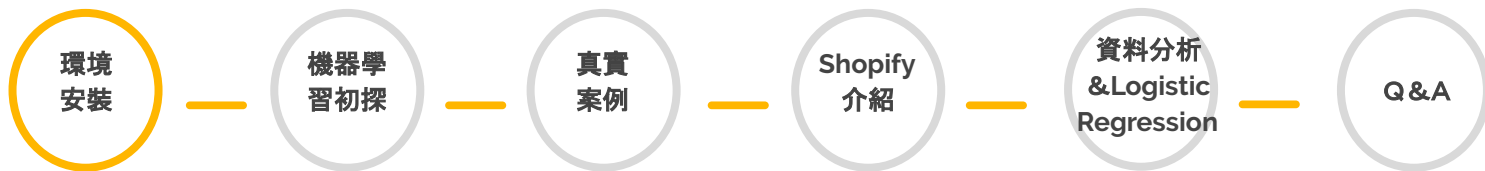
James Yeh



James Yeh

- Yahoo 軟體工程師(Backend, ML)
- 台大電機所
- 網站開發、資料分析、機器學習
- Python 資料分析與機器學習入門
- yehjames23@gmail.com

今天我們會



環境安裝

重裝一個乾淨的**conda**環境(避免套件衝突)

從你的終端機：

```
conda create --name NTUDAC python=3.6
```

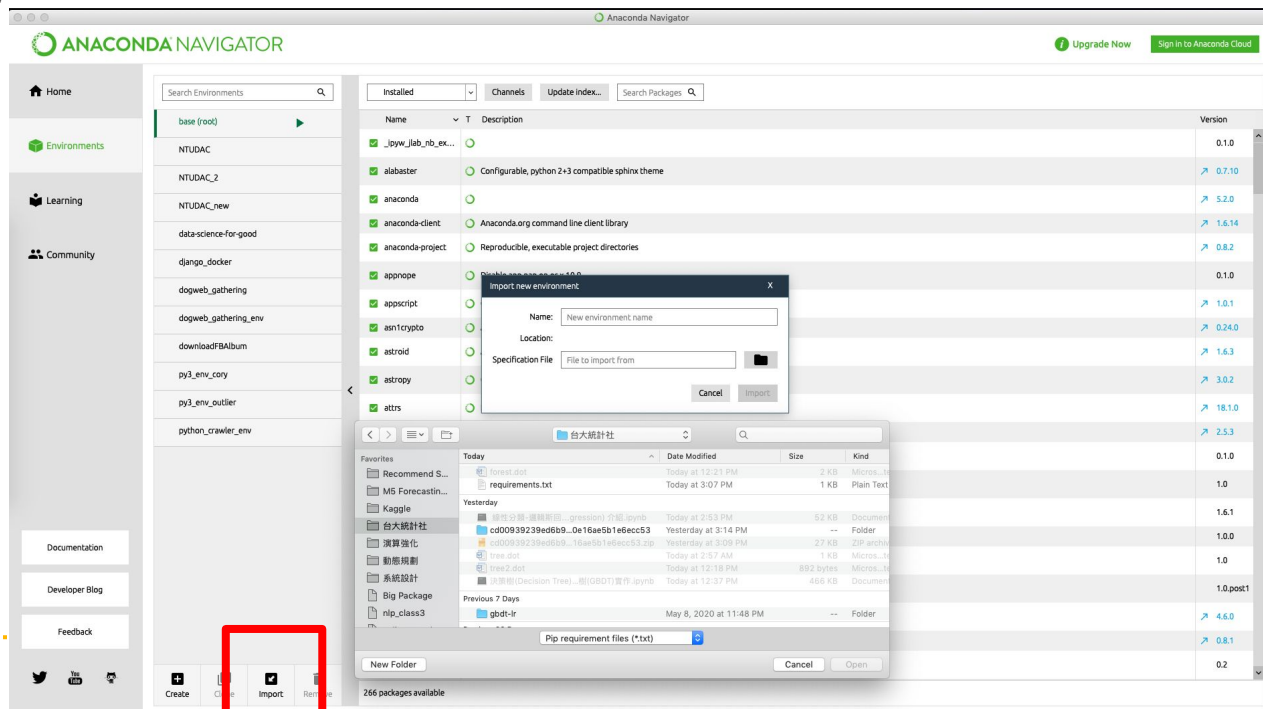
```
conda activate NTUDAC
```

```
pip install -r requirements.txt
```

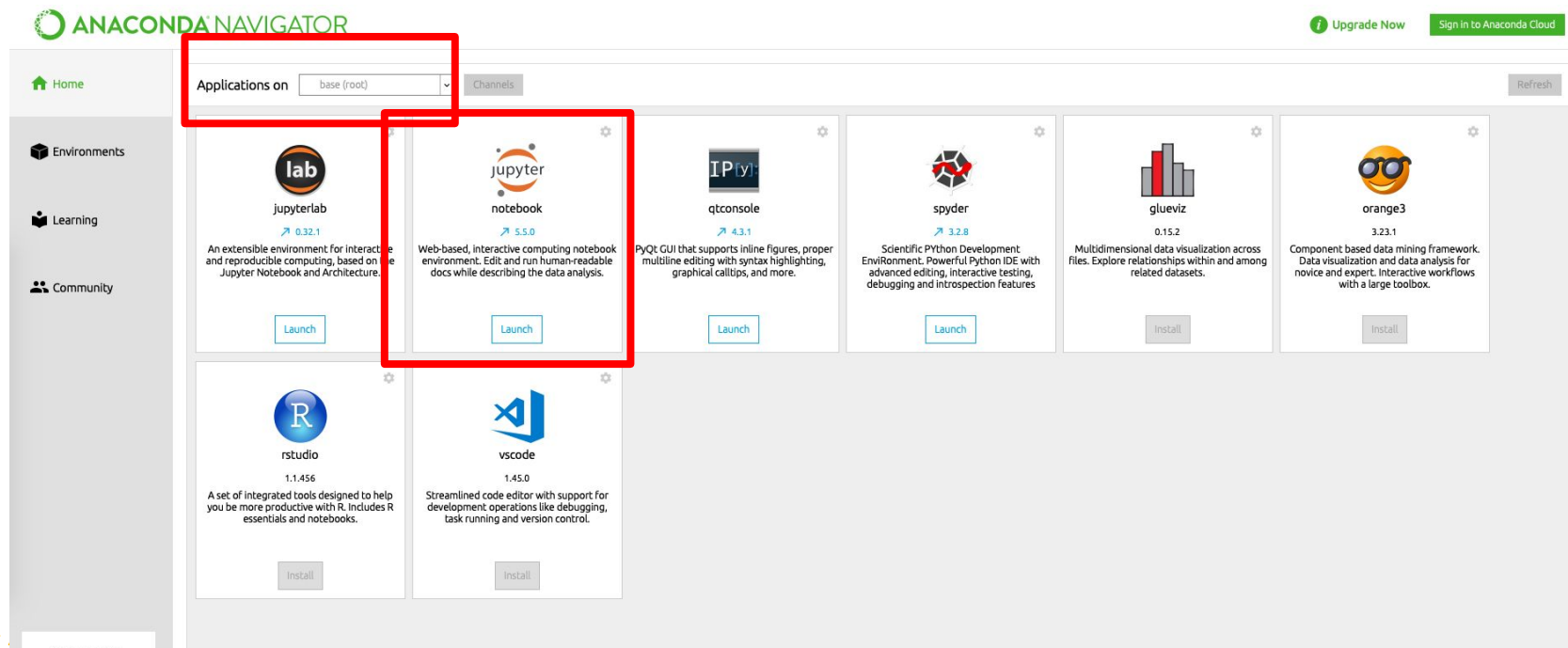
```
conda deactivate
```

或從Anaconda navigator UI

1. 輸入虛擬環境名稱 ex: NTUDAC
2. 選擇import pip檔案
requirements.txt



選擇剛創建的虛擬環境 開啟 Jupyter notebook



機器學習初探

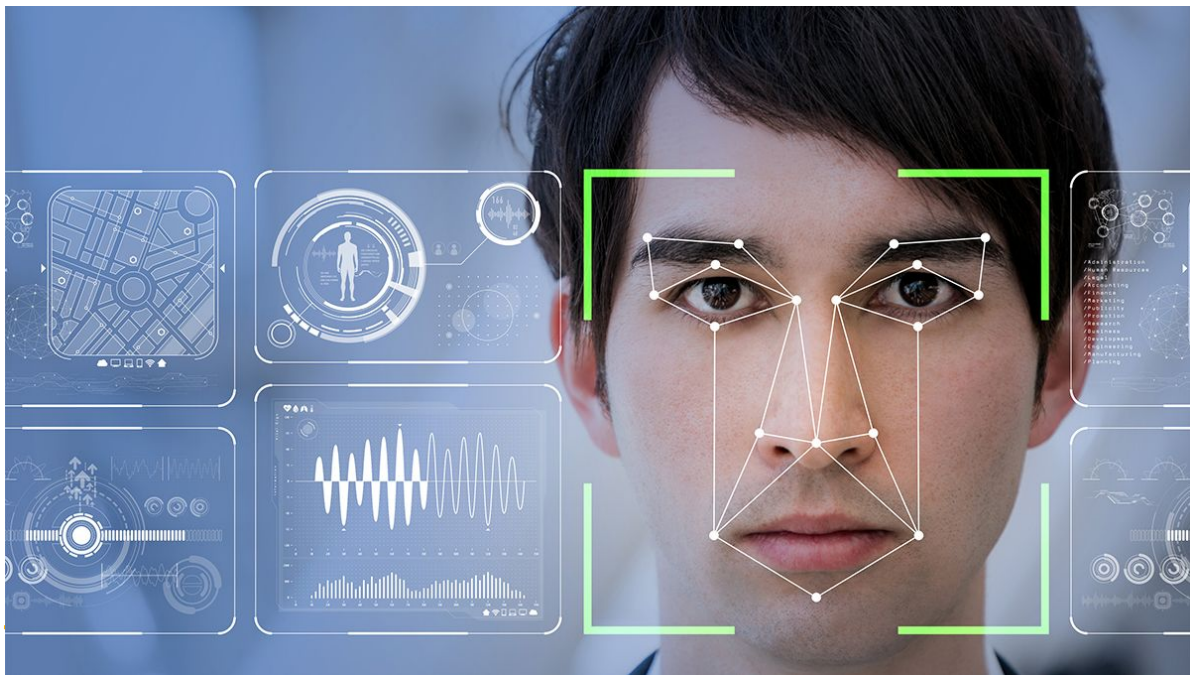
機器學習可以 做什麼呢？

[Python 機器學習以及 Scikit-learn 介紹](#)

垃圾郵件分類



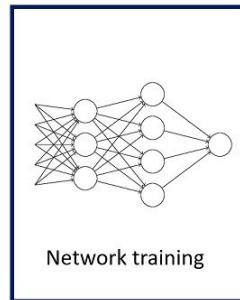
人臉辨識



數字辨識

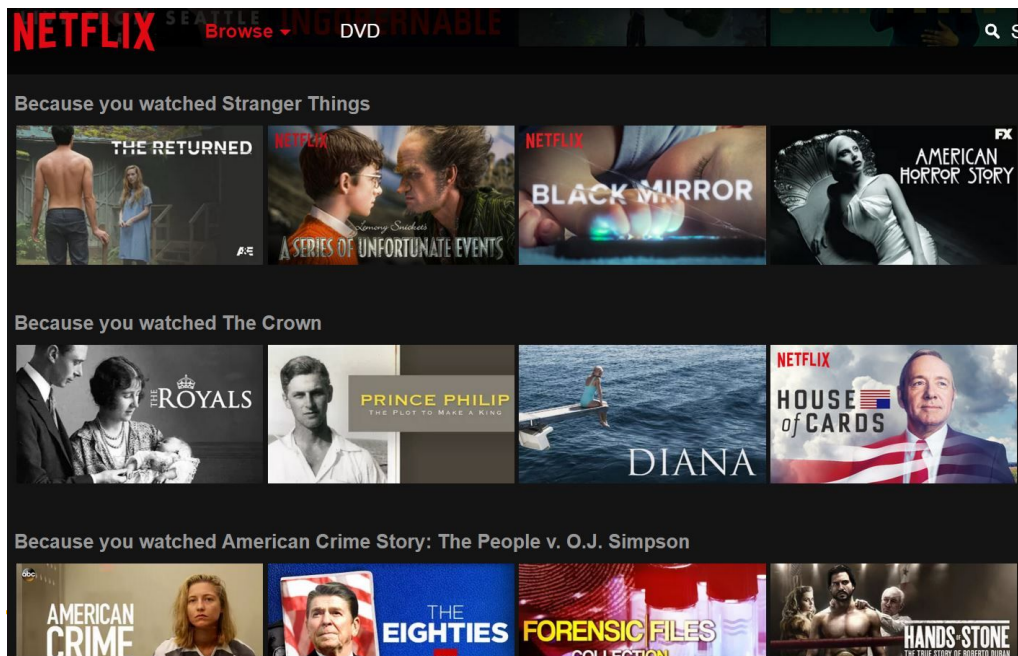


Data & Labels



0
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6
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8
9

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短腿小萝卜_babycarrot

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2017年被畢業後
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11:33

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一名YOUTUBER | 健身心得 | 2020ep09
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Jay Chou, A-Mei, G.E.M., and more

50+
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程亦山帶小萝卜虐扁 (ft.程亦山、平云
龙)
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War】-Official Music Video
Jay Chou, A-Mei, G.E.M., and more

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(+)

Mix - 周杰伦【逆鳞 官方完整MV】Jay Chou
'Against' MV (Ni-Lin)
Jay Chou, A-Mei, G.E.M., and more

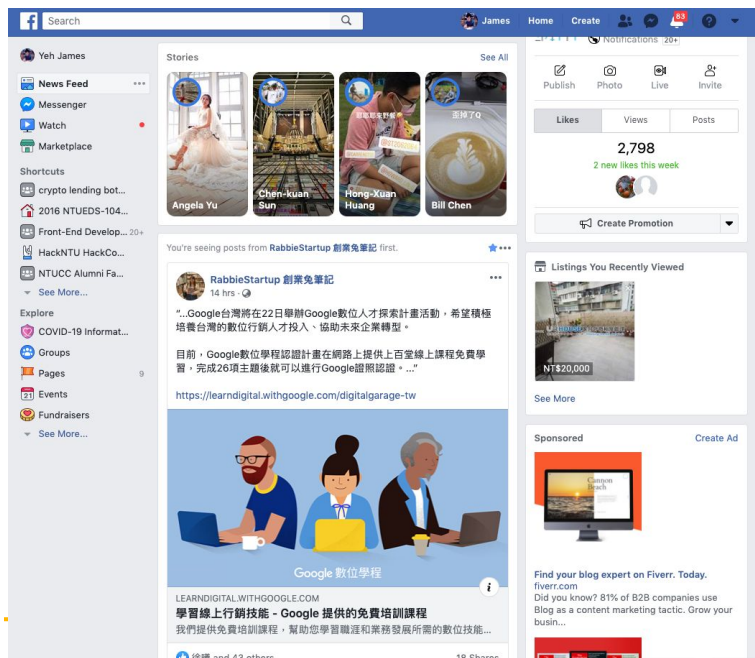
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11:20

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\$11,000 已售出 202



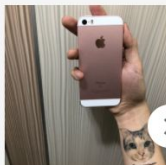
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猜你喜歡



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64G 16G/128G 9.5成新 ...
\$3,465 已售出 6

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真實機器學習案例(Quora)

Yoshua Bengio: Where is deep learning research headed?



Yoshua Bengio, My lab has been one of the three that started the deep learning approach, bac...

14.9k Views • Upvoted by Alberto Bietti • Xavier Amatriain • 23 others you follow

Answer featured in The Huffington Post.

Yoshua has 43 endorsements in Deep Learning.

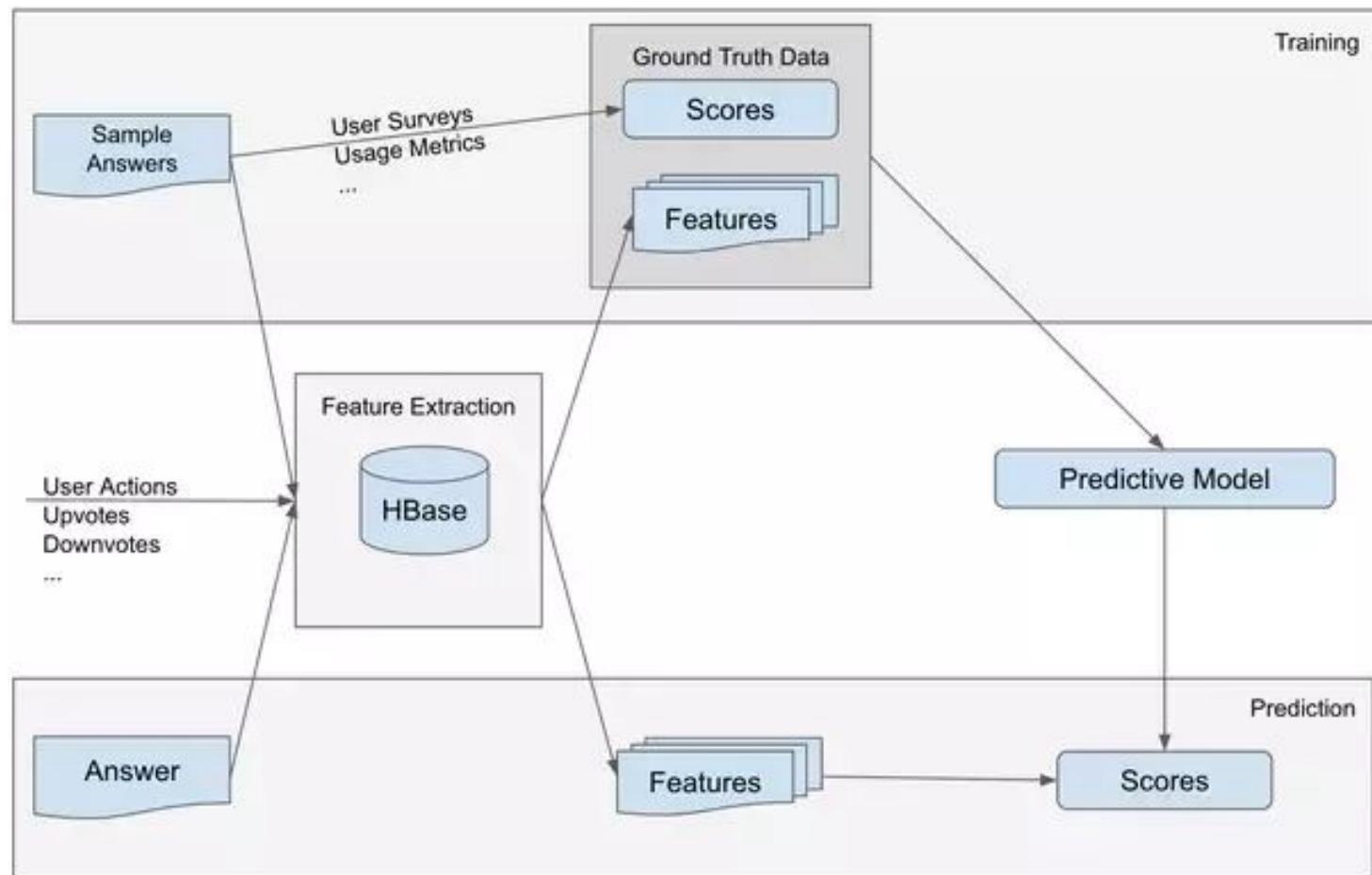
Research is by definition exploratory, which means that (a) we do not know what will work and (b) we need to explore many paths, we need a lot of diversity of research directions in the scientific community. So I can only tell you about my current gut feelings and visions of where I see important challenges and opportunities that appeal to my personal aesthetics and instincts. Here are some elements of this:

* unsupervised learning is crucial and we do not do it right yet (there are many arguments I and others have written and talked about to justify this)

* deep learning research is likely to continue its expansion from traditional pattern

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<https://www.quora.com/q/quoraengineering/A-Machine-Learning-Approach-to-Ranking-Answers-on-Quora>



AI發展

AI發展已成為不可逆的趨勢

- 人臉辨識
- 推薦系統
- ...

各行各業開始使用

大數據+模型節省人力,物力,時間

udn 聯合新聞網 (新聞發布)

自動化與無人化的軍事革新：軍用無人載具的下一階段發展

無人載具進一步快速發展的關鍵，在於結合AI人工智慧。 ... 戰機飛行，由人工智慧系統負責絕大部份的飛行工作，讓一架傳統戰機上的飛行員 ... 由此可見，軍用無人機的發展已跨入空戰的領域中，自動化飛行將取代人工遙控的

1 day ago



UDN 聯合新聞網 (新聞發布)

未來還需人類工作嗎？迎AI時代，與機器共存的預習

《人類未來方程式》中不迴避地一再提起人工智慧將取代基本勞力的主張，但同時也強調人類與機器合作能創造更高的生產力，並帶給人類更好的生活 ...

3 weeks ago



科技新報 TechNews

離全面自動化雖還早，但機器人勞力確實越來越便宜了

... 不斷發展的人工智慧所威脅甚至反噬的情節在文學作品中屢出不窮，機器人取代重複性的勞動工作也是公認的自動化高度發展後可以預見的後果。

4 weeks ago



民報 (新聞發布)

【民報】【專欄】人工智慧拯救建築業

建築公司開始使用AI和機器學習來更好地規劃工作中勞力和機械的分配。機器人 ... 儘管有大量失業預測，人工智慧不太可能取代人力資源。相反，它 ...

5 days ago




何時不用AI



Allie K. Miller • 3rd+

Forbes AI Innovator of the Year | Artificial Intelligence at Amazon | LinkedIn To...

1mo • 

When is machine learning NOT a good idea?

- ✓ No data (due to budget or access)
- ✓ A rules-based solution works
- ✓ Low ROI for your business
- ✓ You just want something cool
- ✓ No tolerance for mistakes
- ✓ No one to maintain it

AI學習門檻(從理論出發不適合初學者)

5. Logistic regression is an important binary classification technique in machine learning that builds off of the concepts of linear regression. Recall that in linear regression, there is a set of predictor variables (or features) $\mathbf{a}_i \in \mathbb{R}^d$, $i = 1, \dots, n$, with corresponding outcome variables $b_i \in \mathbb{R}$, $i = 1, \dots, n$ and our aim is to fit a linear model to the data that minimizes a quadratic loss, namely

$$\min_{\mathbf{x} \in \mathbb{R}^d} \frac{1}{2} \sum_{i=1}^n \left(\langle \mathbf{a}_i, \mathbf{x} \rangle - b_i \right)^2.$$

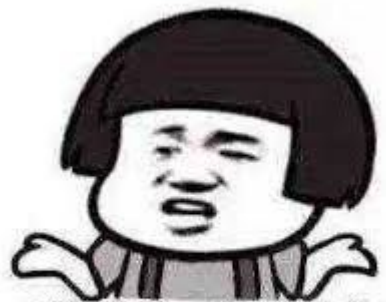
It can be easily seen that the solution to the above least-squares is the same as

$$\min_{\mathbf{x} \in \mathbb{R}^d} f(\mathbf{x}) \triangleq \sum_{i=1}^n \phi(\langle \mathbf{a}_i, \mathbf{x} \rangle) - b_i \langle \mathbf{a}_i, \mathbf{x} \rangle,$$

where $\phi(t) = t^2/2$. Logistic regression can be thought of as a modification of linear regression in two ways: first, the outcome variables are binary representing the two classes, i.e., $b_i \in \{0, 1\}$, $i = 1, \dots, n$, and second, the least-squares loss is replaced with a logistic loss, i.e., $\phi(t) = \ln(1 + e^t)$, where “ln” is natural logarithm. Logistic regression is thus the problems of finding the parameter \mathbf{x} that minimizes this new loss (note that unlike linear regression, there is no closed form solution for logistic regression and one has to resort to optimization algorithms). In machine learning, this phase is often referred to as “training”. After the training phase, we now have a way of classifying a new input, that is not part of your training data, i.e., predicting the label of an out-of-sample data. This phase in machine learning is often called “testing” or “generalization”. More specifically, using our trained logistic model and given any new data \mathbf{a} , we can obtain the probability of \mathbf{a} belonging to either class 0 or 1 as

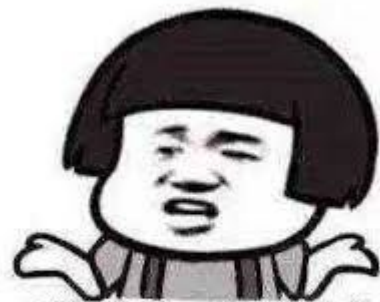
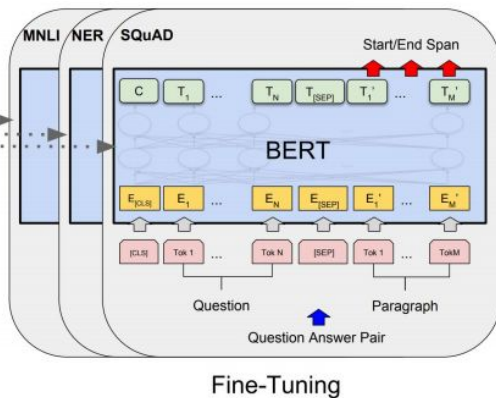
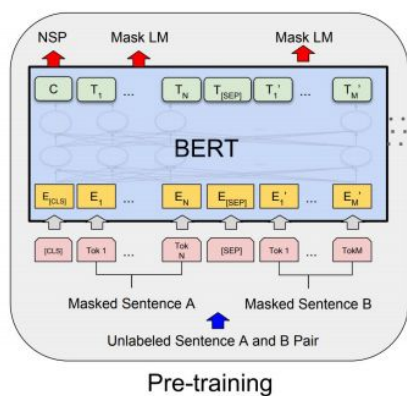
$$\Pr(y = 0 \mid \mathbf{a}) = \frac{1}{1 + e^{(\mathbf{a}, \mathbf{x})}}, \quad \text{and} \quad \Pr(y = 1 \mid \mathbf{a}) = \frac{1}{1 + e^{-(\mathbf{a}, \mathbf{x})}}.$$

(a) Derive the gradient and the Hessian matrix of $f(\mathbf{x})$.



我表示很无奈

AI學習門檻(許多抽象的概念跟前因後果)



我表示很无奈

實際解決問題or面試

1. 定義問題跟分析問題重要度大於ML model
2. 合理的代理問題, (你怎麼量化user的滿意度?)
3. model用最簡單的再慢慢加上去即可(Baseline model)
4. 實際題目(第三堂課):
 - a. 如何設計Facebook news feed ranking
 - b. 如何幫Facebook設計一個檢測NSFW content的系統

AI相關職業

Machine learning/ AI researcher(PhD)

Data scientist(PhD ~ SQL Boy)

Machine learning/ AI Engineer

Business analyst

人類學習-觀察業界典範

Shopify

Shopify介紹

Google

shopify 介紹

Shopify介紹：給台灣、香港與新加坡用戶參考的評價

<https://iknowwang.com>，電商平台比較，shopify ▾ Translate this page

Shopify對於線上販賣就像是會計師對於Microsoft excel一樣，大部分的電子商務商店擁有著都知道如何使用它，建立網路商店真的這麼簡單？我們建議你免費試用看看...

一篇文章帶你全面了解Shopify开店| Shopify教程

<https://www.exporth2c.com>，about-shopify ▾ Translate this page

Dec 6, 2018 · Shopify是什麼？Shopify是一個能讓你自主管理在商店的平台，通過介紹Shopify的由來及發展，Shopify開店優勢，Shopify開店費用以及...

師法亞馬遜，十張圖剖析電商隱形冠軍Shopify | 數位時代

<https://www.bnext.com.tw>，article，shopify-ecommer... ▾ Translate this page

師法亞馬遜，十張圖剖析電商隱形冠軍Shopify，2017.08.15 by IEObserve國際經濟觀察 作者簡介：IEObserve國際經濟觀察 查看更多文章 關心國際經濟、科技和商業...

5招選對開店平台！SHOPLINE 和Shopify 開店平台大比拼...

<https://shopline.tw>，首頁，開店教學 ▾ Translate this page

Aug 2, 2018 · 今天SHOPLINE 就和Shopify來個比較，看看那個適合你作為電商創業的開始！... 適合自己的平台是哪裡，下半部會比較全球兩大開店平台SHOPLINE 和Shopify 的十個功能... 8個遠端工作線上工具介紹，在家工作，防疫一次搞定！

People also search for

shopline評價ptt SHOPLINE POS

shopify台灣金流 Wix 購物車

shopline教學 shopify教學

Shopify 中文版來了！ - Shopify Taiwan

<https://www.shopifytaiwan.com>，shopify中文版來了！ ▾ Translate this page

號稱地表最強的線上開店平台Shopify，現在官方推出Shopify 繁體中文版操作手冊，終於可以把你Google 翻譯丟一邊，讓開店過程更簡單！Shopify 說明中心引導你從...

20個最佳的Shopify主題和漂亮的電商界面設計

<https://webdesign.tutsplus.com>，zh-hant，articles，20... ▾ Translate this page

Nov 20, 2019 · 你可以在Envato Market上我們提供的Shopify電商主題中找到所有符合... 問到的問題、添加了更為清晰的產品介紹、添加選擇性文字到你的圖片、...

Market Summary > Shopify Inc

NYSE: SHOP

+ Follow

586.60 USD -43.83 (6.95%) ↓

Apr 21, 1:09 PM EDT · Disclaimer

1 day 5 days 1 month 6 months YTD 1 year 5 years Max



Open	647.00	Div yield	-
High	665.74	Prev close	630.43
Low	556.01	52-wk high	665.74
Mkt cap	68.30B	52-wk low	216.62
P/E ratio	-		



More about Shopify Inc

Shopify App store



Categories ▾

Collections ▾

Search

Shopify.com ▾

Log in

☐ See only compatible apps

☒ All (426)

☐ Sales and conversion (210) ▾

☐ Store design (174) ▾

☐ Marketing (125) ▾

☐ Customer support (40) ▾

☐ Reporting (38) ▾

☐ Orders and shipping (32) ▾

☐ Finances (18) ▾

☐ Productivity (15) ▾

☐ Inventory management (15) ▾

☐ Places to sell (12) ▾

☐ Finding products (8) ▾

☐ Trust and security (4) ▾

☒ All pricing (426) ⌵

☐ Free

208

☐ Paid

218

Works with apps made by
Shopify ⌵

☐ Shopify POS

6

☐

1 - 24 of 426 results



LimeSpot Personalizer

[Ad] • Free to install
Personalized
Recommendations, Upsell &
Cross sell with AI
★ 4.8 (1377)



Upsell Recommendations

Free
100% free Amazon-like
personalized upsell
recommendations
★ 4.6 (287)



LimeSpot Personalizer

Free to install
Personalized
Recommendations, Upsell &
Cross sell with AI
★ 4.8 (1377)



**Globo Upsell, Related
Products**

Free plan available
Frequently Bought Together,
Recommended, Related
Products
★ 4.6 (305)



Route - Shipping Insurance

[Ad] • Free
One-Click Shipping Insurance
★ 4.6 (63)



**Personalized
Recommendations**

Free plan available
Personalized
Recommendations, Related
Product, Bought Together
★ 5.0 (57)



Also Bought - Cross Sell

30-day free trial
Best related product
recommendations. Awarded
Best App 2019
★ 4.9 (575)



**Recom.ai - Upsell &
Cross-sell**

Free plan available
Boost sales with upsell & cross-
sell recommendations app
★ 4.7 (166)



SmartrMail Email Marketing

[Ad] • Free plan available
Easily send better email
newsletters. Mailchimp
alternative.
★ 4.8 (212)



Frequently Bought Together

30-day free trial
Amazon-like Recommended
Products, Upsell Bundles and
Discounts
★ 4.9 (1469)



**Personalized
Recommendations**

Free plan available
AI Personalized
Recommendations. Guaranteed
results.
★ 4.9 (40)



**Personalized
Recommendations**

Free plan available
AI upsell, cross-sell, related
products, recommended
products
★ 4.3 (26)

Shopify App store



Categories ▾

Collections ▾



Search

Shopify.com ▾

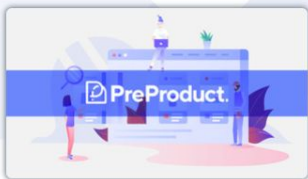
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Every business is unique.
Find the app that's right for yours.

Search apps



Staff picks



by PreProduct

Test and Make Sales for Future Products



by Okendo

The New Standard in Customer Reviews.



by Campaign Monitor

Email Marketing Automation, Reviews & Popups. (Prev Conversio)



by SendOwl

Sell digital files and downloads

Shopify 推薦系統介紹



Authors: Dóra Jámbar and Chen Karako

There is a good chance you have come across a “recommended for you” statement somewhere in our data-driven world. This may be while shopping on Amazon, hunting for new tracks on Spotify, looking to decide what restaurant to go to on Yelp, or browsing through your Facebook feed — ranking and recommender systems are an extremely important feature of our day-to-day interactions.

This is no different at Shopify, a cloud-based, multi-channel commerce platform that powers over 600,000 businesses of all sizes in approximately 175 countries. Our customers are merchants that use our platform to design, set up, and manage their stores across multiple sales channels, including web, mobile, social media, marketplaces, brick-and-mortar locations, and pop-up shops.

<https://engineering.shopify.com/blogs/engineering/how-shopify-uses-recommender-systems-to-empower-entrepreneurs>

Shopify 推薦系統-解釋性

Create and ship custom products with one of these top print on demand apps

Suggested based on pages you've looked at.



teelaunch

View



Printify: 200+ Print on Demand products

View



Printful - Printing & Warehousing

View

[View more print on demand apps](#)

Today's recommended accounting app: Xero

Other apparel and accessories stores in the US use Xero to track sales and prepare for tax season.







[View in Shopify App Store](#)

Shopify 推薦系統-結果

- Merchants receiving personalized app recommendations on the Shopify App Store had a 50% higher app install rate compared to those who didn't receive recommendations

Data preprocess & analysis







資料探索神器

 [pandas-profiling](#) / [pandas-profiling](#)   1.1k  122  4.9k  663



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Create HTML profiling reports from pandas DataFrame objects

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 475 commits  4 branches  0 packages  24 releases  33 contributors  MIT

Branch: [master](#) [New pull request](#) [Create new file](#) [Upload files](#) [Find file](#) [Clone or download](#)

 [sbrugman](#) [skip ci] Update documentation  Latest commit 298f6ba 9 days ago

 .github	Setup a Github Actions workflow to aid development	9 days ago
 docs	[skip ci] Update documentation	9 days ago
 examples	[skip ci] Update examples and version bump	9 days ago
 src/pandas_profiling	[skip ci] Update examples and version bump	9 days ago

<https://github.com/pandas-profiling/pandas-profiling#examples>

客戶行為數

VisitorId

Categorical

HIGH CARDINALITY

Distinct count	2542
Unique (%)	25.4%
Missing	0
Missing (%)	0.0%
Memory size	78.2 KiB

013f6b5f-75a7-4edd-7ad5-fd2... 68
71cfdcf1-0acc-4e12-20a3-79b... 66
5de0be9d-0a4d-4e0e-3796-e... 57
cb03c085-ab9e-4790-87b8-e... 54
81e16c41-6da9-4726-29ff-e50... 52

Other values (2537)

9703

Toggle details

Common Values

Length

Characters

Value	Count	Frequency (%)
013f6b5f-75a7-4edd-7ad5-fd28445a2adf	68	0.7%
71cfdcf1-0acc-4e12-20a3-79b7de018f67	66	0.7%
5de0be9d-0a4d-4e0e-3796-e820b80ebcbcb	57	0.6%
cb03c085-ab9e-4790-87b8-e22ffd4c5a9c	54	0.5%
81e16c41-6da9-4726-29ff-e50b78475785	52	0.5%
f495245e-b286-4e45-2b97-f08e57baaa1d	51	0.5%
71338b7d-3fe5-4238-367b-fcca6b9f9ae4	46	0.5%
d0d98953-c1cb-4d5c-5942-11ad249a28c9	44	0.4%
a296aa21-1e5f-4591-ae58-d6d82dabec0a	43	0.4%

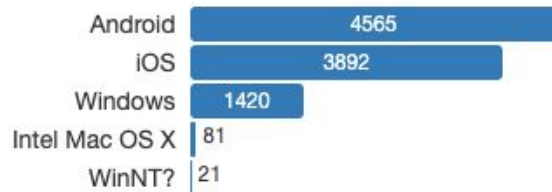
裝置行為數

是手機App步驟比較複雜還是大家喜歡用手機App？

OperationSystem

Categorical

Distinct count	6
Unique (%)	0.1%
Missing	8
Missing (%)	0.1%
Memory size	78.2 KiB



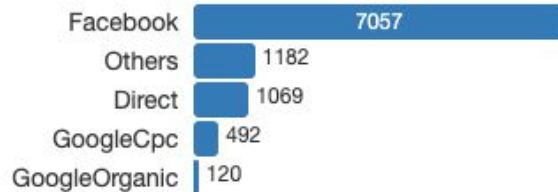
Toggle details

流量來源

TrafficSourceCateg...

Categorical

Distinct count	6
Unique (%)	0.1%
Missing	0
Missing (%)	0.0%
Memory size	78.2 KiB



Toggle details

行為比例

```
profile.to_notebook_iframe()
```

Pandas Profiling Report

[Overview](#)[Variables](#)[Interactions](#)[Correlations](#)[Missing values](#)[Sample](#)

BehaviorType

Categorical

Distinct count	6
Unique (%)	0.1%
Missing	0
Missing (%)	0.0%
Memory size	78.2 KiB

ViewSalePageCategory	5060
ViewSalePage	4745
Cart	127
Fav	31
Purchase	24

[Toggle details](#)[Common Values](#)[Length](#)[Characters](#)

Value	Count	Frequency (%)
ViewSalePageCategory	5060	50.6%
ViewSalePage	4745	47.4%
Cart	127	1.3%
Fav	31	0.3%
Purchase	24	0.2%
Search	13	0.1%

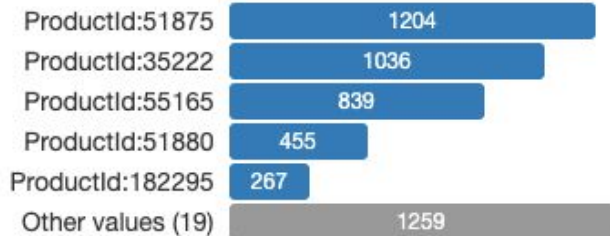
類別比例

CategoryId

Categorical

MISSING

Distinct count	24
Unique (%)	0.5%
Missing	4940
Missing (%)	49.4%
Memory size	78.2 KiB



Toggle details

Hack一下

<https://www.so-nice.com.tw/v2/official/SalePageCategory/51875?sortMode=Curator>

<https://www.so-nice.com.tw/v2/official/SalePageCategory/35222?sortMode=Curator>

商品價格

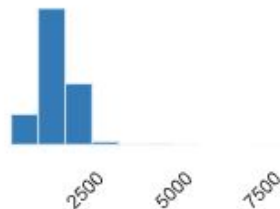
ProductPrice

Real number ($\mathbb{R}_{\geq 0}$)

MISSING

Distinct count	32
Unique (%)	0.7%
Missing	5104
Missing (%)	51.0%
Infinite	0
Infinite (%)	0.0%

Mean	1659.1584967320262
Minimum	390.0
Maximum	7980.0
Zeros	0
Zeros (%)	0.0%
Memory size	78.2 KiB



Toggle details

客單價

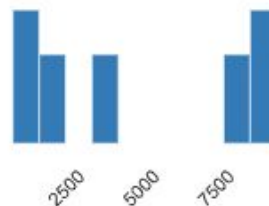
TransactionRevenue

Real number ($\mathbb{R}_{\geq 0}$)

MISSING

Distinct count	12
Unique (%)	50.0%
Missing	9976
Missing (%)	99.8%
Infinite	0
Infinite (%)	0.0%

Mean	4896.25
Minimum	670.0
Maximum	9480.0
Zeros	0
Zeros (%)	0.0%
Memory size	78.2 KiB



Toggle details

Live Demo 分析

Logistic Regression

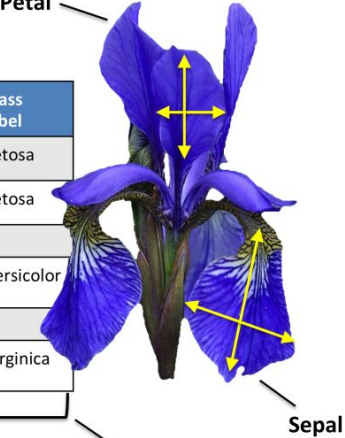
資料集 - Iris data set

Samples
(instances, observations)

	Sepal length	Sepal width	Petal length	Petal width	Class label
1	5.1	3.5	1.4	0.2	Setosa
2	4.9	3.0	1.4	0.2	Setosa
...					
50	6.4	3.5	4.5	1.2	Versicolor
...					
150	5.9	3.0	5.0	1.8	Virginica

Features
(attributes, measurements, dimensions)

Class labels
(targets)



The diagram shows a blue Iris flower. A label 'Petal' points to the upper petals, and a label 'Sepal' points to the lower petals. Yellow arrows indicate measurements: a vertical double-headed arrow on a petal for length, and a horizontal double-headed arrow on a sepal for width.

給花瓣、萼片 長跟寬

預測Iris花的品種

資料集 - Iris data set

IRIS dataset



Iris Versicolor



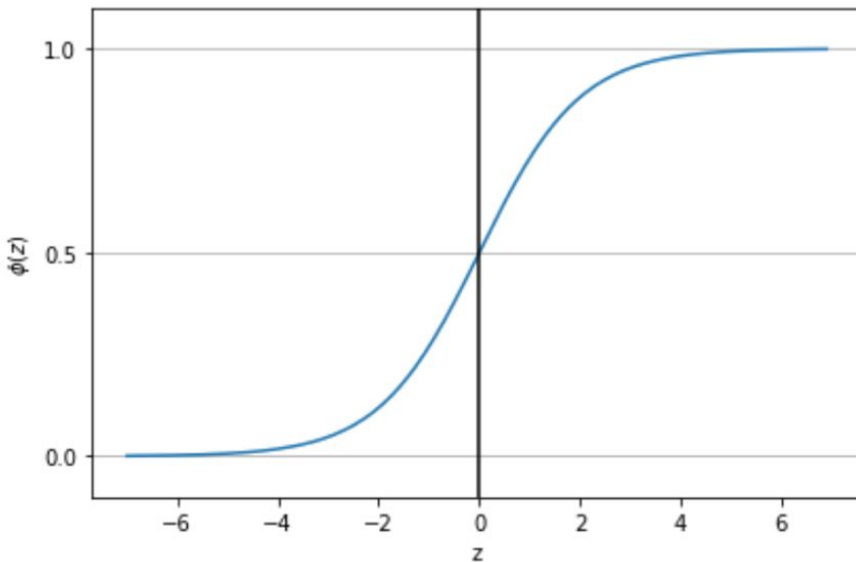
Iris Setosa



Iris Virginica

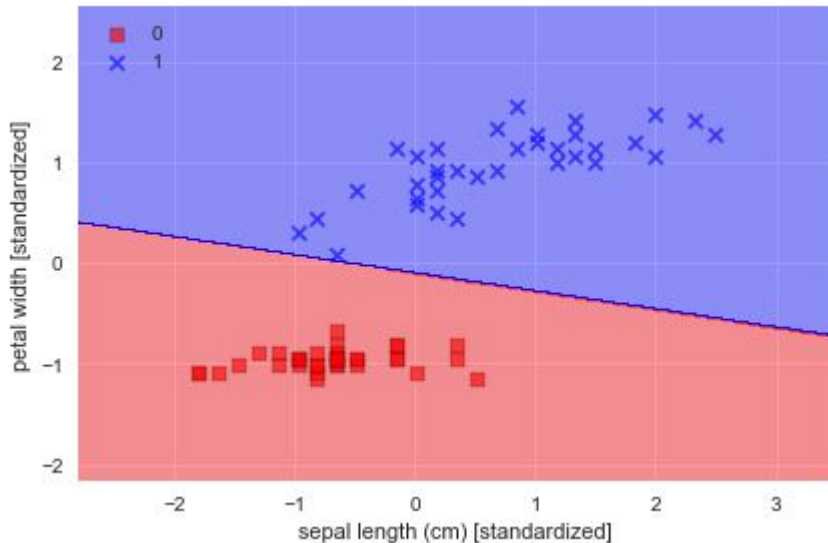
Logistic Function

$$z = w^T x$$
$$\phi(z) = \frac{1}{1 + e^{-z}}$$



Logistic Regression 能做什麼？

線性分類



$$aX + bY + c = 0$$

Live Demo

課後學習資源

學習資源

Blog

[\[資料分析&機器學習\] 第2.3講:Pandas 基本function介紹\(Series, DataFrame, Selection, Grouping\)](#)

[\[資料分析&機器學習\] 第2.4講:資料前處理\(Missing data, One-hot encoding, Feature Scaling\)](#)

[\[資料分析&機器學習\] 第2.5講:資料視覺化\(Matplotlib, Seaborn, Plotly\)](#)

[\[資料分析&機器學習\] 第3.1講:Python 機器學習以及Scikit-learn介紹](#)

[\[資料分析&機器學習\] 第3.2講:線性分類-感知器\(Perceptron\) 介紹](#)

[\[資料分析&機器學習\] 第3.3講:線性分類-邏輯斯回歸\(Logistic Regression\) 介紹](#)

書

[Python 機器學習](#)

學習資源

Github

<https://github.com/Avik-Jain/100-Days-Of-ML-Code>

“

Q & A

Thanks!

