Group 3

Introduction to Data Science

Instructors:
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Data Science

Members

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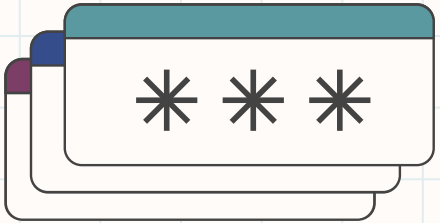
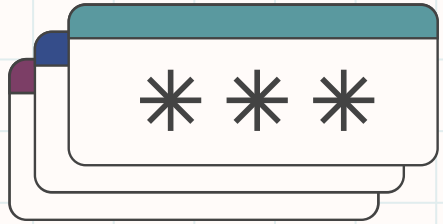
01

About project



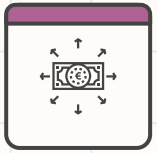
About project



- Data is crawled for analysis, statistics and sales to help Tiki’s sellers supply and demand adjustment.

- Predict the number of products sold in Tiki.

About Data



p_id	Id of the product
p_name	Name of the product
p_id_shop	Shop id that sells the product
p_shop_name	Shop name that sells the product
p_brand	Brand of the product
p_categories	Category of product

p_day_create	Number of days the product was created since data collection
p_sold_quanlity	Number of the product sold
p_original_price	Original price of the product
p_current_price	Current price of the product
p_discount_rate	Discount rate of the product

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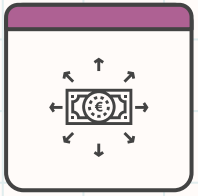
02

Questions

We will create questions and derive insight the data.

Meaningful Questions

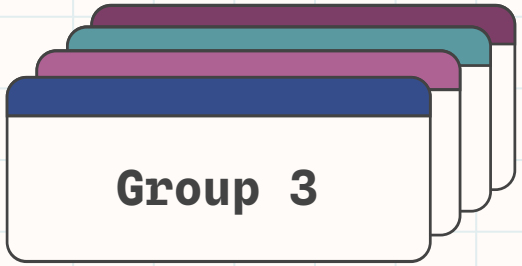


Question 1:

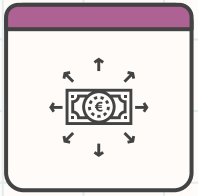
Which store sells best and what items in that store sell best? Why is it the best seller?

Question 2:

Sales of each category in “Tiki trading”. The best-selling category accounts for what percentage of that sales?

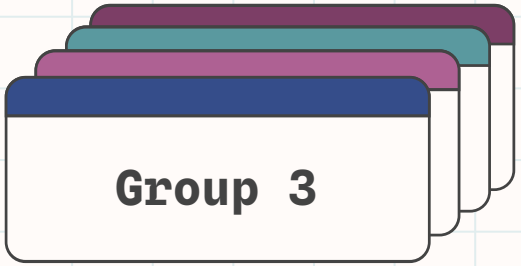


Meaningful Questions



Question 3:

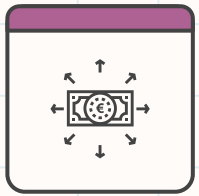
Compared with the discount and no discount, which shop's items sell the best?



Question 4:

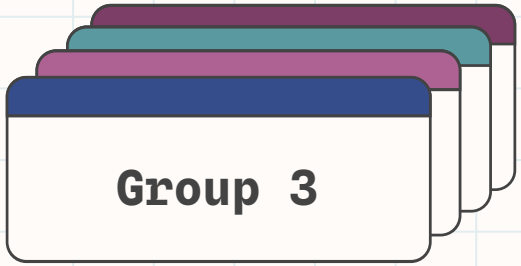
Calculate the average daily sales of the brand. Bring out the brand with the highest and lowest revenue.

Meaningful Questions



Question 5:

What products do brands have? Compare sales of the same product but in different brands.



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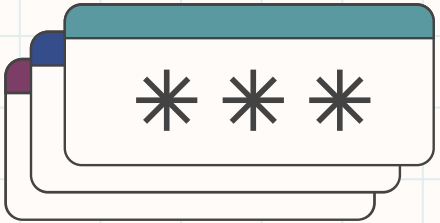
03

Model & Evaluation

Use model to predict the number of products sold in Tiki.



Models

Linear Regression

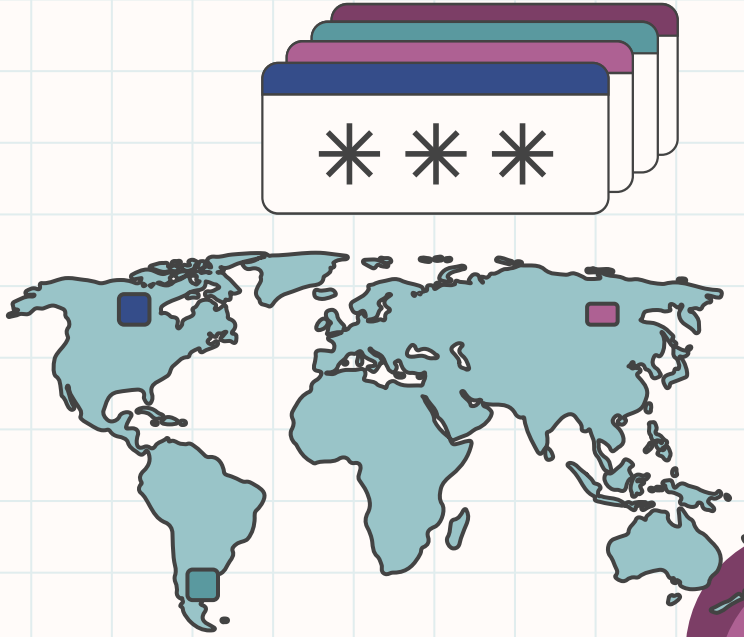
Mercury is the closest planet to the Sun

Polynomial Regression

Venus has a beautiful name and is a hot place

SGD Regression

Despite being red, Mars is actually a cold place



Linear Regression

```
# Create a pipeline
pipe = Pipeline([('scaler', StandardScaler()), ('linear', LinearRegression())])
param_grid = {'linear__fit_intercept': [True, False], 'linear__normalize': [True, False]}
```

Features

- Use all features in data

Parameters

- Fit_intercept: False
- Normalize: True

Result with hyperparameters

```
MSE: 2810870.2668518866
MAE: 706.8482621921839
RMSE: 1676.5650201682863
```

Linear Regression

```
# Create a pipeline
pipe = Pipeline([('scaler', StandardScaler()), ('linear', LinearRegression())])
param_grid = {'linear__fit_intercept': [True, False], 'linear__normalize': [True, False]}
```

Features

- Drop original price and discount rate

Parameters

- `Fit_intercept: False`
- `Normalize: True`

Result with hyperparameters

```
MSE: 2979927.108555989
MAE: 733.6665041091812
RMSE: 1726.2465375942072
```

❏ **Comments:**

- RMSE and MSE in Linear Regression is really high because the features in data are not linear with each other.(as figure in code)

Polynomial Regression

```
param_grid = {
    'polynomialfeatures__degree': [3,4,5],
    'linearregression__fit_intercept': [True, False],
    'linearregression__normalize': [True, False]
}
```

Features

- Use all features in data

Parameters

- Degree: 3
- Fit_intercept: False
- Normalize: True

Result with hyperparameters

```
MSE:  1013254.5587648819
MAE:  536.8049929030901
RMSE:  1006.6054633096733
```

Polynomial Regression

```
param_grid = {
    'polynomialfeatures__degree': [3,4,5],
    'linearregression__fit_intercept': [True, False],
    'linearregression__normalize': [True, False]
}
```

Features

- Drop original price and discount rate

Parameters

- Degree: 3
- Fit_intercept: False
- Normalize: True

Result with hyperparameters

```
MSE:  1415302.2459402957
MAE:  582.5604298069323
RMSE:  1189.664761998226
```

❏ **Comments:**

- RMSE and MSE in Polynomial Regression is still high but better than Linear Regression.

SGD Regression

```
param_grid = {'sgdregressor__loss': ['squared_loss', 'huber', 'epsilon_insensitive', 'squared_epsilon_insensitive'],
              'sgdregressor__penalty': ['l2', 'l1']}
```

Features

- Use all features in data

Parameters

- Loss: Squared_loss
- Penalty: l2

Result with hyperparameters

```
MSE:  4.614723229934231e+40
RMSE:  2.1481906875168765e+20
```

❏ **Comments:**

- RMSE and MSE in SGD Regression is Incredibly big, so the SGD regression model cannot predict the number of units sold for each product

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04

Reflection

For each member re-evaluate the work

If we have more time...

We will

- Create more questions and derive important, useful insights from the data.
- Use more techniques to find hyperparameters
  - Such as Bayes search...
- Predict top trending or not
  - May be using Logistic Regression
- Compare with more model to find the optimal result
  - Such as Bayesian Linear Regression,...

For each member…

ID Student: 20127458 - Đặng Tiến Đạt

What difficulties have you encountered?

- **Github**: merge code with notebook files (conflict,...)
- **For each step:**
  - **Data engineer:** Data exchange protocols, choose the right API for you and the params, headers, ... required to be able to request the API. Data cleaning is not good, leading to errors when the model
  - **Data analyst:** Choose how to visualize to be reasonable for the question you posed, statistical methods to find that question.
  - **Machine learning:** Choose the right algorithm models to make accurate predictions, scale the data as well as create a pipeline to process each different thread, how to evaluate the model, which model will be selected when completed.

What have you learned?

- Understand the workflow of a data science as well as be more careful in each step so that the next steps do not affect much
- Proficient in using project libraries (numpy, pandas, matplotlib, ...)

For each member…

ID Student: 20127627

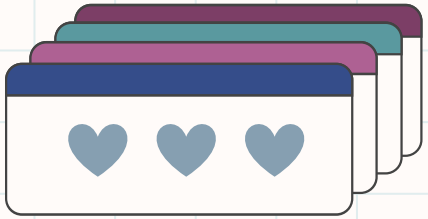
What difficulties have you encountered?

- About data collection, I had difficulty in crawling data by getting API.Finding data and how to crawl using the API is also the first time, so it is quite difficult.
- About clear and preprocess data: It is quite difficult to clear data from crawl data, data is missing, data type is wrong a lot, making it quite difficult for me to keep or delete that row. And about the examination as well as asking questions and answering, as this is the first time, it is a challenge to ask meaningful questions
- About the model, because I have not studied machine learning, it is quite difficult to choose a model and use it as input, and the model's prediction is wrong, the difference is too much, it is also unpredictable.

What have you learned?

- Crawl data using API
- Learn how to ask questions based on data and visualize questions correctly
- Steps to clean data and explore data
- Learn how to model data, based on the given data to try to predict a feature

For each member…



ID Student: 20127680 - Phạm Thị Ánh Phát

What difficulties have you encountered?

- Because Tiki does not provide API so we have manually crawl data for each page.
- Because i had not learned model before, so i have difficult in using model to predict. But now, i can :D

What have you learned?

- Learn the process of Data Analysis. From raw data to visualize data for customers.
- Learn how to analysis information of products in order to bring benefits in business.
- Learn how to use pipeline in preprocessing.
- Learn how to use techniques to evaluate predicted models.

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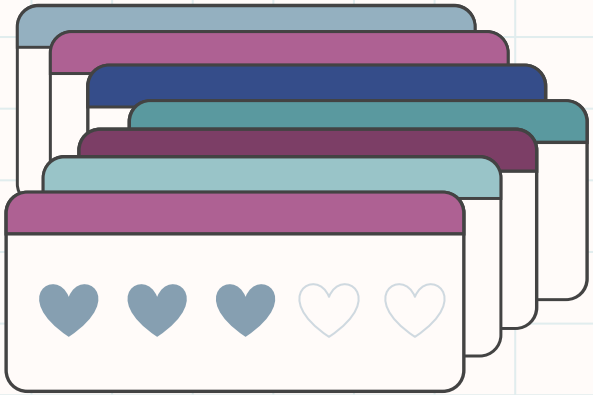
Thanks!

Do you have any questions?

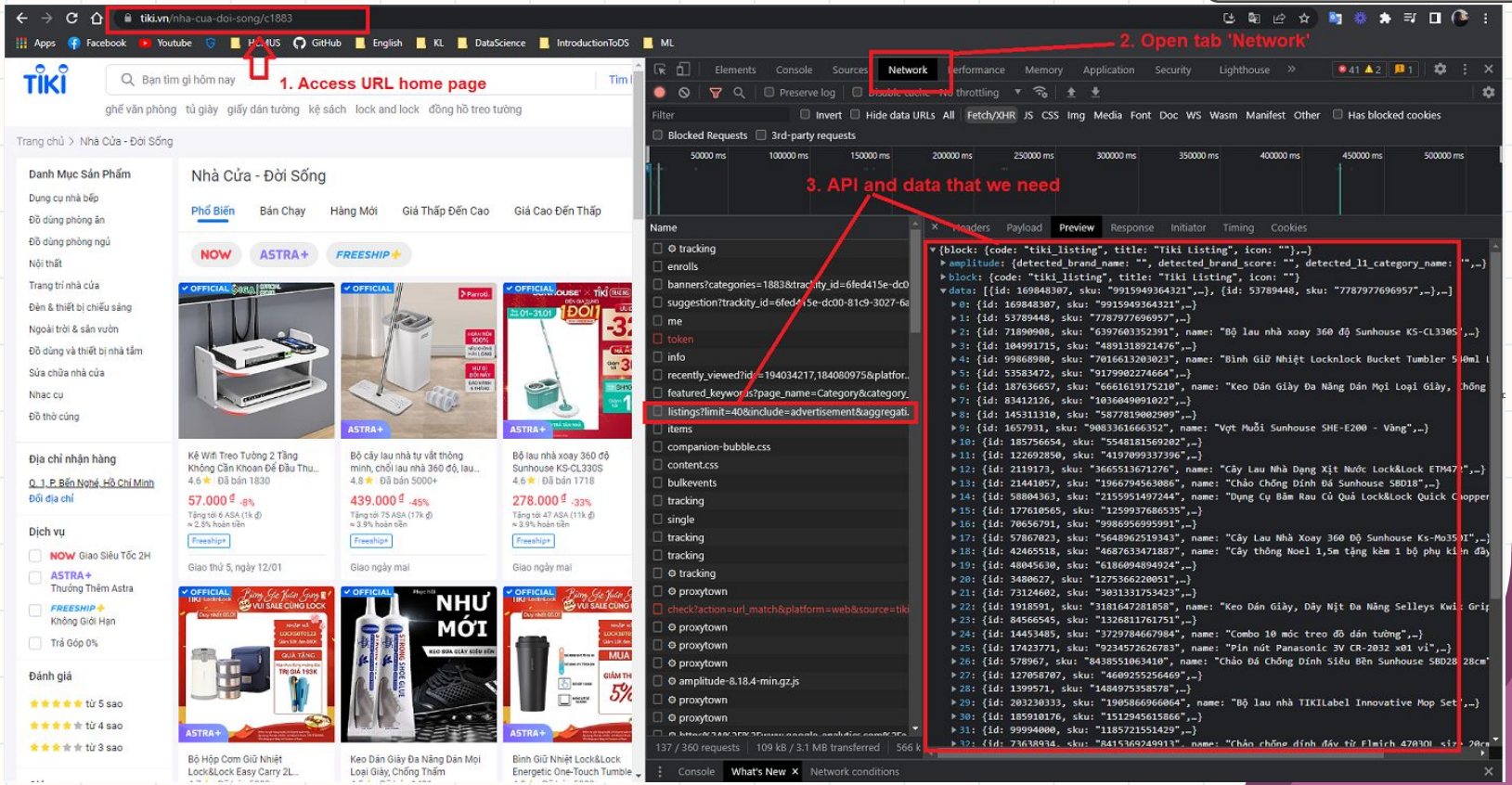


References

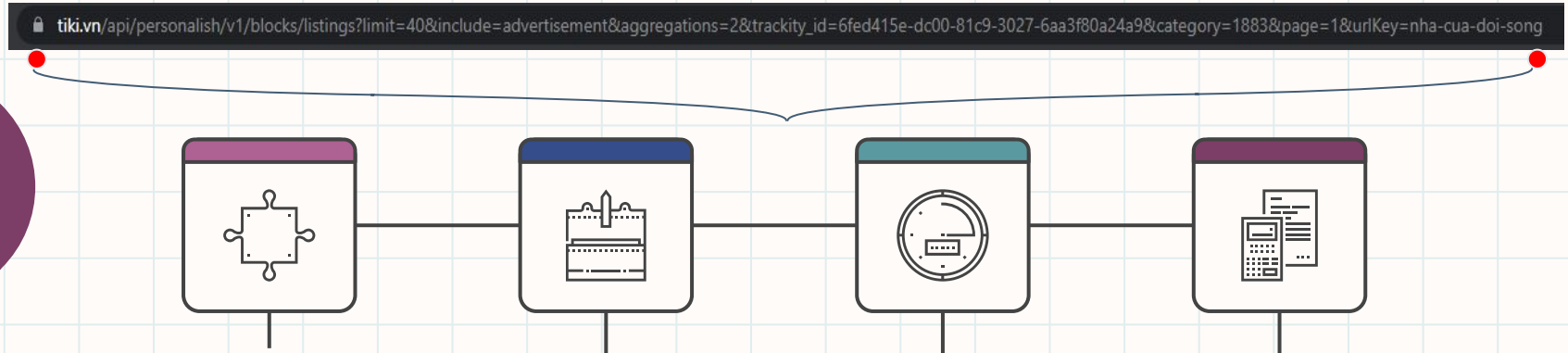
- https://machinelearningcoban.com/2016/12/28/linearregression/
- https://scikit-learn.org/stable/modules/generated/sklearn.pipeline.Pipeline.html
- Two files demo assignment in class.
- https://slidesgo.com/theme/pestel-analysis-thesis-defense?fbclid=IwAR1Ju4MeCCwSeQ-v7PPUJEE0do0IPxpMTB4FVhLm3zmzq0AEx8GWqd1ptks#position-132&results-11706
- https://www.kaggle.com/datasets/hellbuoy/car-price-prediction

2.1. What is API of Tiki ?

Collection



2.2. How to request this API?



Method & URL

Example: Method (get, post,...), URL (link we need request)

Header

Example: token access, User-agent, ..

Param

Example: page, platform, category, ...

Cookie

Cookie of website (Note: removed)