EduCraft:
AI AND ART

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目錄
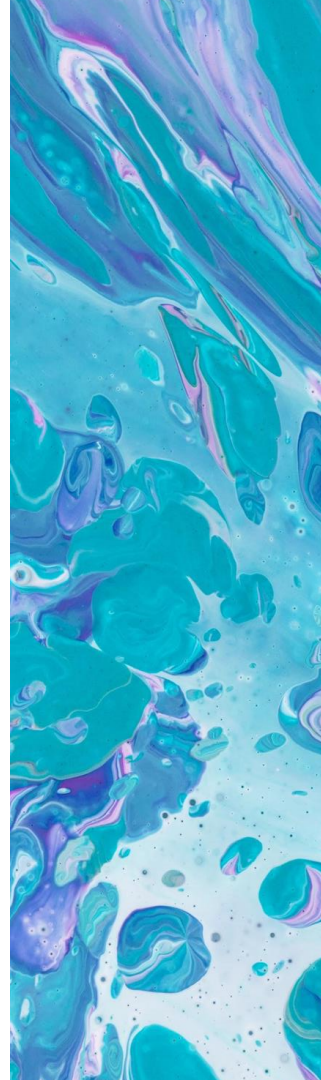# TABLE OF CONTENTS

01

Introduction

User Story

Shi-Hua (世華) is a museum exhibition organizer at NPM (國立故宮博物院).

She has to:

propose 2~4 exhibitions projects every year.

work on her own research topic.

impossible to be familiar with all artcrafts

There are more Curators like Shi-Hua (世華)...

HOLDING AN EXHIBITION IS TIME CONSUMING...

Idea Genaration

Staffing Exhibition Projects

Overall Organization

Exhibition Selection Critiria and Approval Process
70% Time

Project Management

CASE STUDY-NPM(故宮)

- The NPM has nearly **700,000** artifacts.
- With a collection of this size, only **1%** of the collection is exhibited at any given time.
- **Impossible** to be familiar with every art crafts in anyone's lifetime.

- An exhibition is planned about **1~2 years** earlier.
- A researcher usually has to deal with **1~2 exhibition** planning simultaneously, except special exhibition and collaboration.
- **Not familiar** with all exhibition topic/artcrafts.
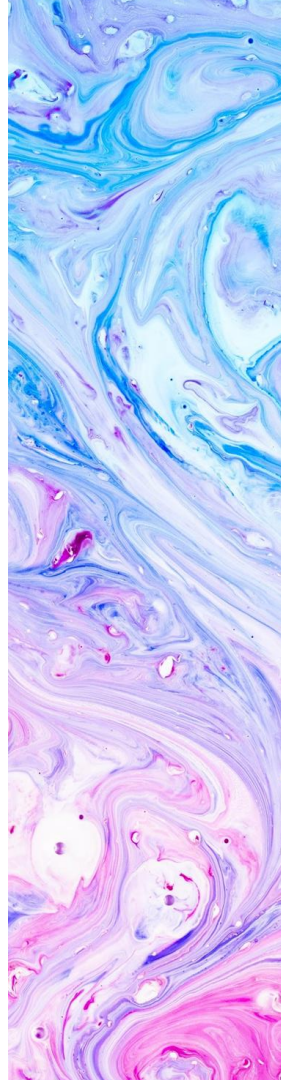
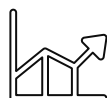# 藏品數量-故宮博物院案例
INFLUENCE OF ART

6.9%
瓷器
Venus has a
beautiful name

10%
清宮檔案文獻
It's the closest
planet to the Sun

30.3%
善本書籍
Despite being red,
Mars is cold

30%
玉器
It's the biggest
planet of them all

3.7%
其他

02 Problem & Solution

Target Audience and their Problems。Our Solution

Target Audience and their Problems

- Target Audience
  - Curators (museum exhibition organizer)
- Problem
  - No time to glance through every artcrafts
    - Similar artcrafts recommendation?
  - Might not be familiar with every artcrafts
    - A technology that recognise its chronology according to artstyle

Solution: EduCraft

Museum open data

ML model predicts
Chinese Chronology

User upload the
picture of artcrafts

Recommend related
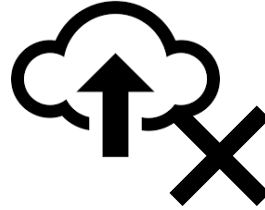artcrafts

Demo Time
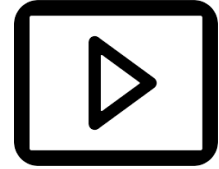
Please look at my phone :)

AIANDART

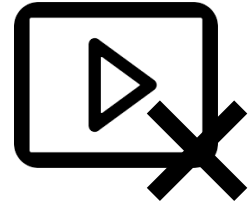# Business Model

EduCraft Free Trial

Limited data upload

Commercial Ads
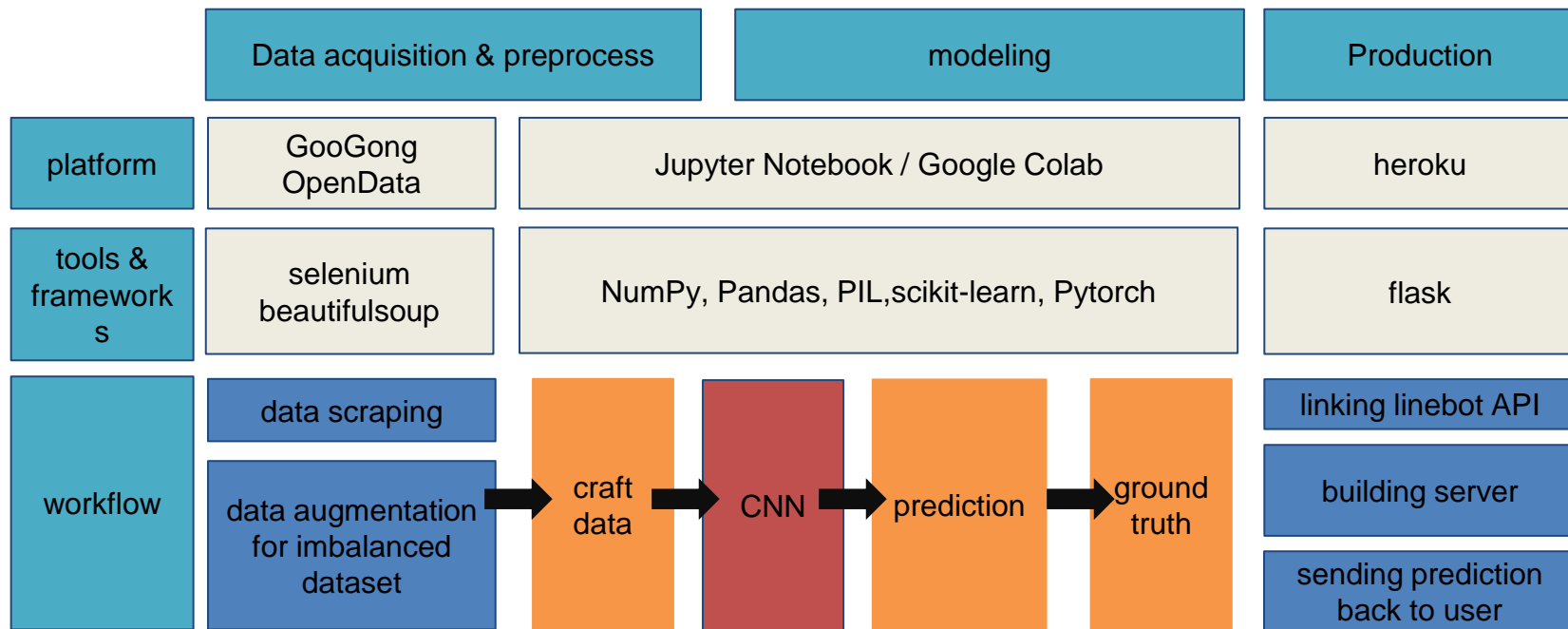
EduCraft primium

Unlimited data upload

NO commercial Ads

03 Technique & Workflow

Data Preprocess ◦ Modeling ◦ Production

開發流程
Basic Workflow

	Data acquisition & preprocess		modeling	Production
platform	GooGong OpenData	Jupyter Notebook / Google Colab		heroku
tools & frameworks	selenium beautifulsoup	NumPy, Pandas, PIL,scikit-learn, Pytorch		flask
workflow	data scraping			linking linebot API
	data augmentation for imbalanced dataset → craft data → CNN → prediction → ground truth			building server
				sending prediction back to user

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Data Scraping

精選圖像下載

| 依朝代 | 全部 | 新石器時代 | 商 | 西周 | 東周 | 春秋 | 戰國 | 秦 | 漢 | 西漢 | 新 | 東漢 | 魏晉南北朝 | 隋 |
| | 唐 | 五代十國 | 宋 | 北宋 | 金 | 南宋 | 元 | 明 | 清 | 民國 | 時代不詳 |

依類別	全部	未分類 (989)	銅器 (2137)	陶瓷器 (5009)	玉器 (3649)	漆器 (263)	琺瑯器 (1232)
	雕刻 (355)	文具 (802)	錢幣 (0)	雜項 (1879)	織品 (0)	繪畫 (2890)	法書 (919)	法帖 (190)
	絲繡 (154)	成扇 (203)	拓片 (0)	善本書籍 (235)	檔案文獻 (2)

| 關鍵字 | 請輸入關鍵字 |

搜尋

AI AND ART

Data Scraping

清 嘉慶 青花鳳凰紋盤
高3.6公分 口徑16.5公分 底徑9.5公分

清 嘉慶 青花鳳凰紋盤
高3.6公分 口徑16.5公分 底徑9.5公分

元-明 玉劍璲
長8.08公分 寬2.9公分

元-明 玉劍璲
長8.08公分 寬2.9公分

清 玉磬形佩
全高1.9公分 最長4.14公分

明至清 玉扳指
全高2公分 最長3.86公分

◀ **1** 2 3 4 5 6 7 8 ▶

Data Scraping

清 嘉慶 青花鳳凰紋盤

文物圖檔編號：K1B002835N000000000PAD
類別：陶瓷器
典藏尺寸：高3.5公分 口徑16.5公分 底徑9.7公分
功能：盛裝器
質材：礦物/陶瓷/

class="download-btn"
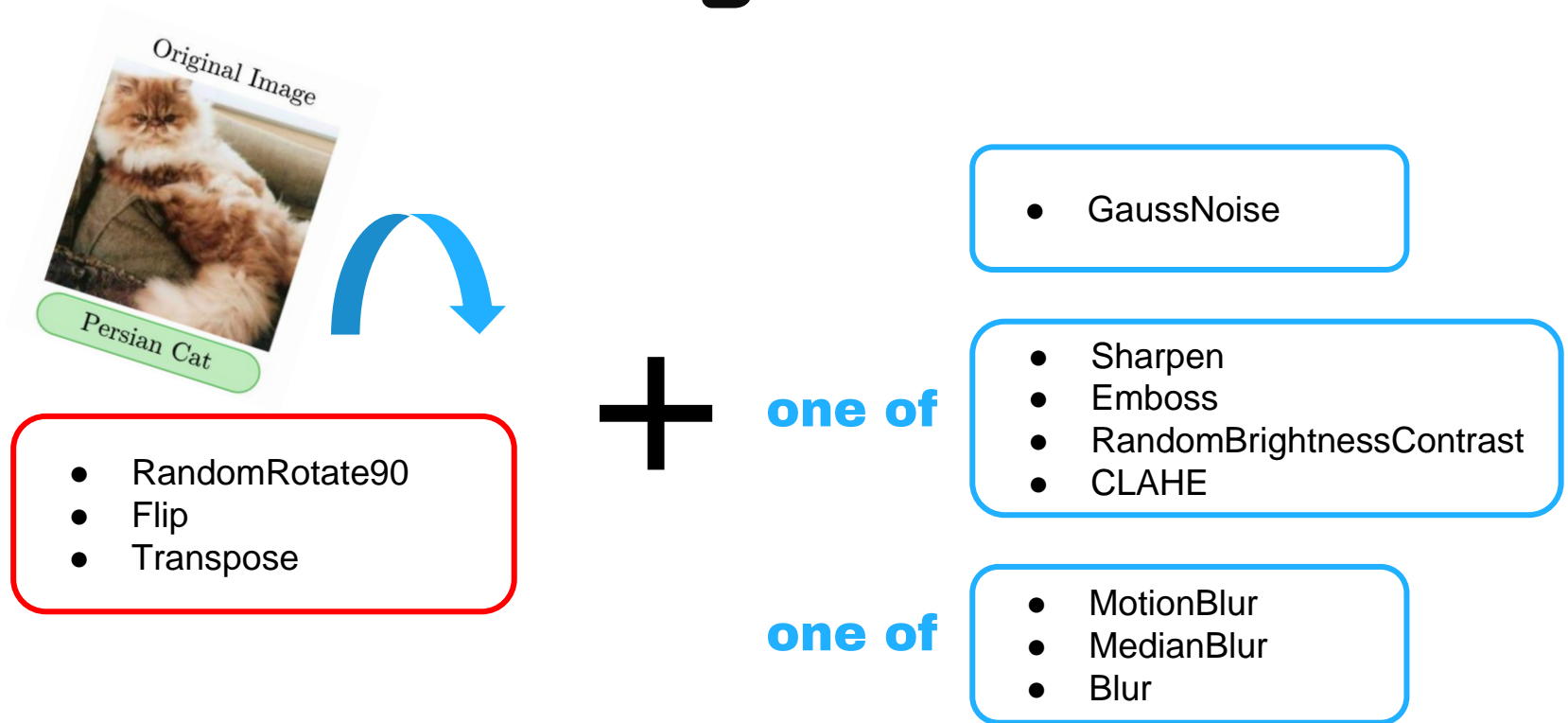
下載

Data Class Distribution

Data class distribution
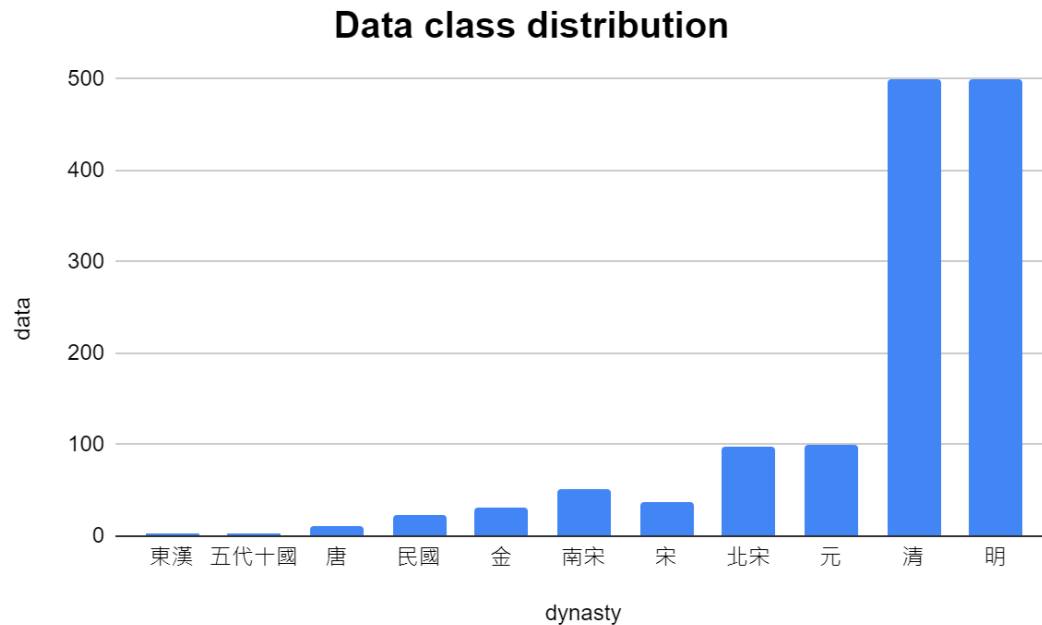
Data Preprocessing

1. data labeling -> "dynsty _ number .tif"

1. data augmentation -> to deal with the data imbalance problem

Data Augmentation

Original Image

Persian Cat

- RandomRotate90
- Flip
- Transpose

+

one of

- GaussNoise

- Sharpen
- Emboss
- RandomBrightnessContrast
- CLAHE

one of

- MotionBlur
- MedianBlur
- Blur

Data Augmentation

Original Image

Persian Cat

Data Augmentation

Blur — Toy Poodle

Noise — Chow-chow

Contrast — Persian Cat

Data Augmentation

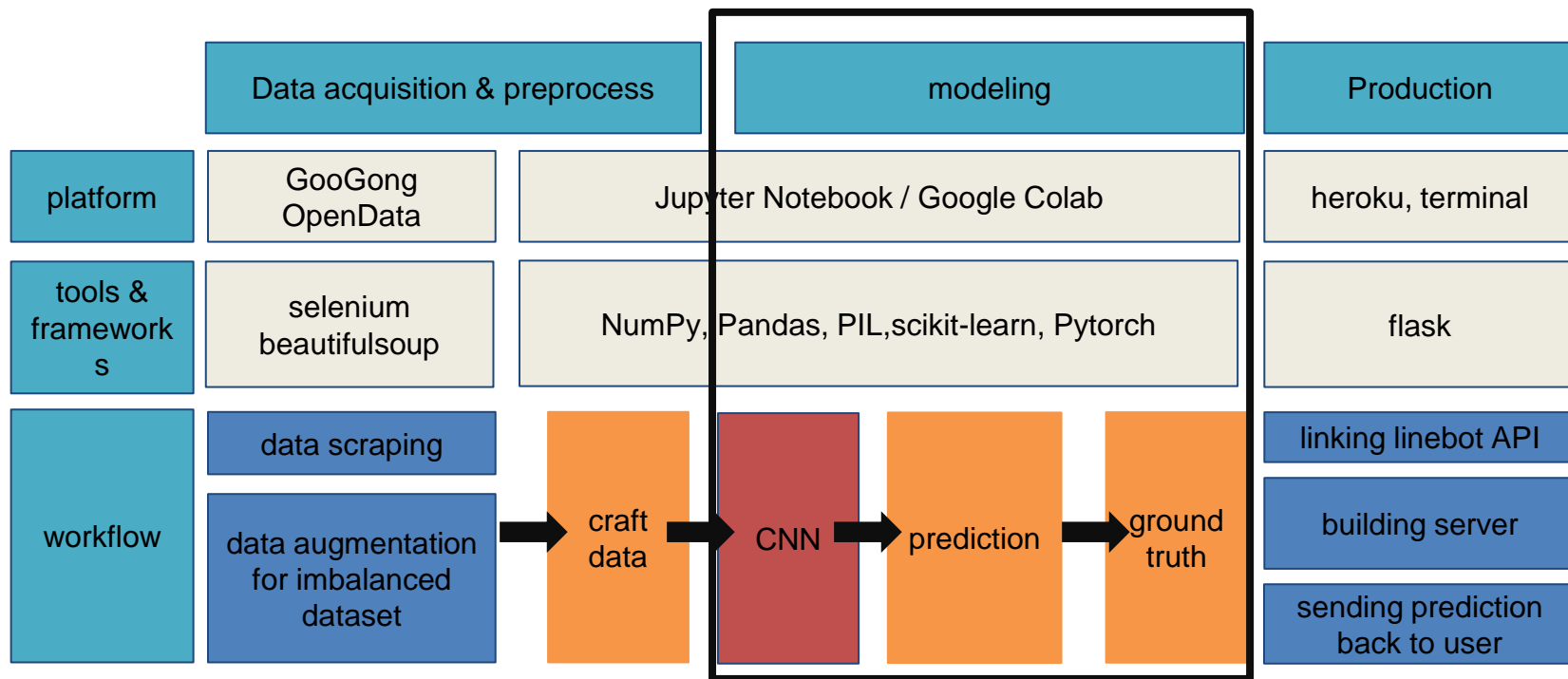**Original**
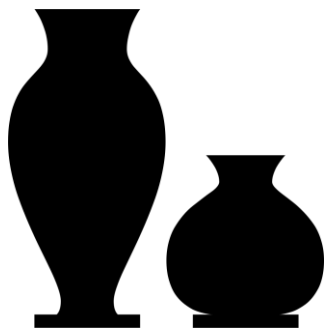
After Augmentation

Data Augmentation
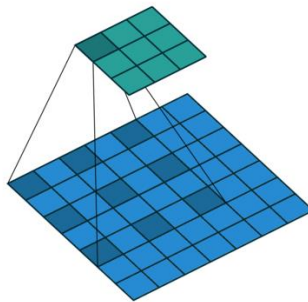
Original

After Augmentation

開發流程
Basic Workflow

	Data acquisition & preprocess		modeling			Production
platform	GooGong OpenData	Jupyter Notebook / Google Colab				heroku, terminal
tools & frameworks	selenium beautifulsoup	NumPy, Pandas, PIL,scikit-learn, Pytorch				flask
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Modeling Process

Input

Photograph of artwork

Model

Algorithm

Output

1. Predicting dynasty.
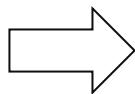2. Matching artwork with similar style. (developing)

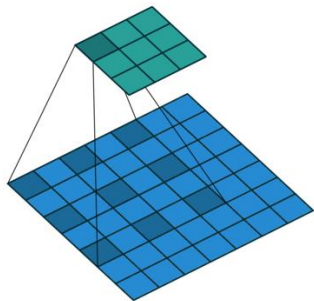# 1. Predicting Dynasty Process

Labeled data classified by dynasty

Model (conv2d)

Unlabeled data

training

predicting

6 dynasties:
-Song Dynasty 宋朝
-Jin Dynasty 金朝
-Yuan Dynasty 元朝
-Ming Dynasty 明朝
-Qing Dynasty 清朝
-Republic of China 民國

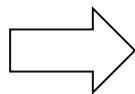Applies a 2D convolution over an input signal composed of several input planes.

?

Use the model to predict the dynasty of artwork.
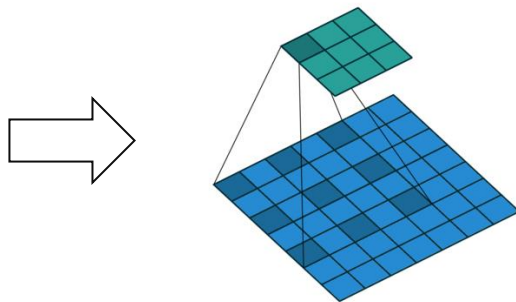
1. Predicting Dynasty Process

Input

Taperstick (ca. 1700–1710)
From

Model (conv2d)

Applies a 2D convolution over an input signal composed of several input planes.

Output

清朝
Qing

1636-1912

Use the model to predict the dynasty of artwork.
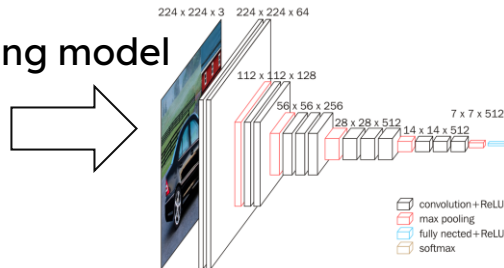
2. Matching Process (Developing)

Labeled data classified by dynasty

Model (VGG16)

Matching Artwork

6 dynasties:
-Song Dynasty 宋朝
-Jin Dynasty 金朝
-Yuan Dynasty 元朝
-Ming Dynasty 明朝
-Qing Dynasty 清朝
-Republic of China 民國

loading model

matching

224 x 224 x 3 224 x 224 x 64
112 x 112 x 128
56 x 56 x 256
28 x 28 x 512
14 x 14 x 512
7 x 7 x 512
1 x 1 x 4096 1

convolution+ReLU
max pooling
fully nected+ReLU
softmax

?

Feature extraction.
Reverse Image Search.

Use the model to match artwork with similar style.

2. Matching Process (Developing)

Input

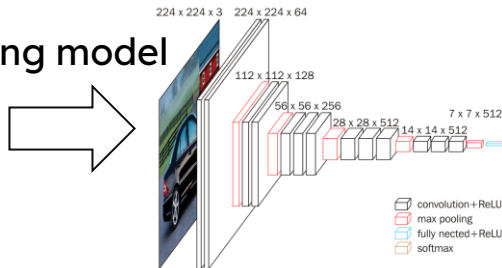**Model (VGG16)**

Matching Artwork

loading model

matching

Feature extraction.
Reverse Image Search.

Taperstick (ca. 1700–1710)
From

Use the model to match artwork with similar style.

開發流程
Basic Workflow

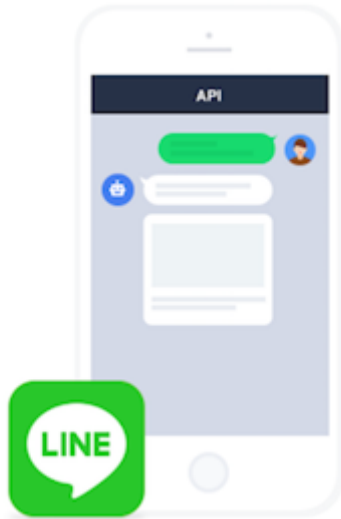|	Data acquisition & preprocess		modeling				Production
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workflow	data scraping						linking linebot API
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Platform Introduction: linebot
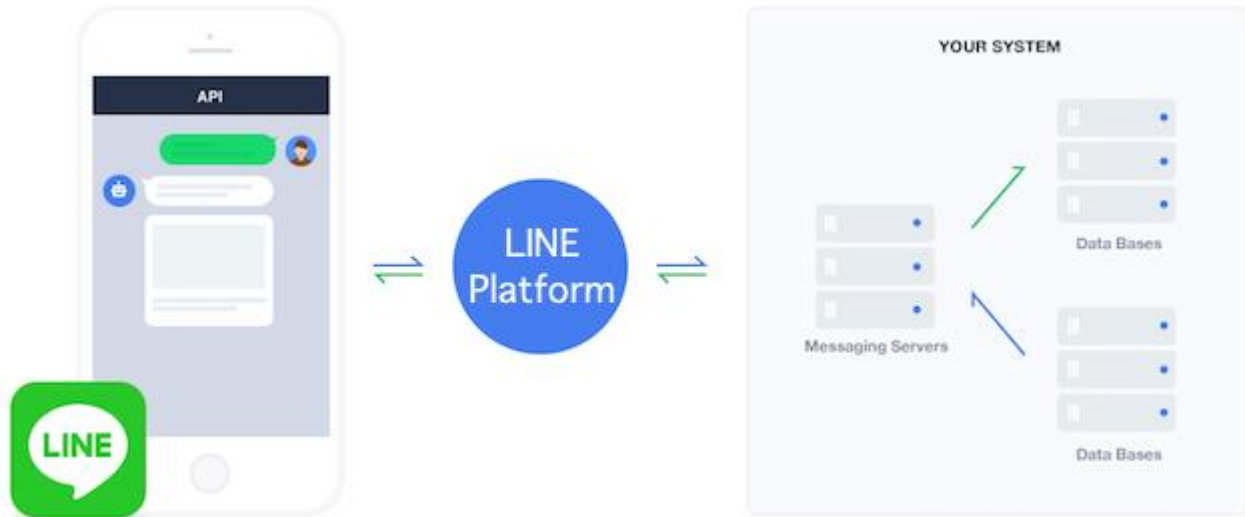
Advantage of the platform

- Developer-Friendly
- Users don't need to install new extension / apps
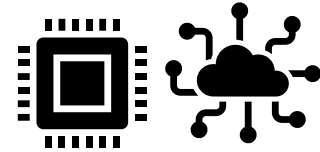- Light
- Mobility

Production

Upload picture + text request

Prediction 'Qing dynasty '

Artcraft recommendation
(future feature)

model.py

Server

User

04 Technology Feasibility

Future Application ◦ Core Values

Future Application & Improvement

- Reduce model size to increase response speed
- Increase model accuracy
- provide the information of that artcraft during recommendation process

EduCraft's Core Value

Use AI technology to help museum and related exhibition agency to increase efficiency, promote the museum education for our society

THANK YOU FOR LISTENING