DEVELOPING YOUR FINAL PROJECT USING ARTIFICIAL INTELLIGENCE WITH PYTHON

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OUTLINE

CHAPTER 1

INTRODUCTION

- INVENTED IN THE NETHERLANDS, EARLY 90S BY GUIDO VAN ROSSUM NAMED AFTER MONTY PYTHON
- OPEN SOURCED FROM THE BEGINNING
- CONSIDERED A SCRIPTING LANGUAGE, BUT IS MUCH MORE
- SCALABLE, OBJECT ORIENTED AND FUNCTIONAL FROM THE BEGINNING
- USED BY GOOGLE FROM THE BEGINNING
- INCREASINGLY POPULAR

FEATURES

- ❖Open source and free
- ❖Easy to learn
- ❖Extensive libraries
- ❖Extensible
- ❖Object-oriented
- ❖Interpreted and easy to debug
- ❖Dynamically-typed
- ❖Portable

BENEFITS OF LEARNING PYTHON

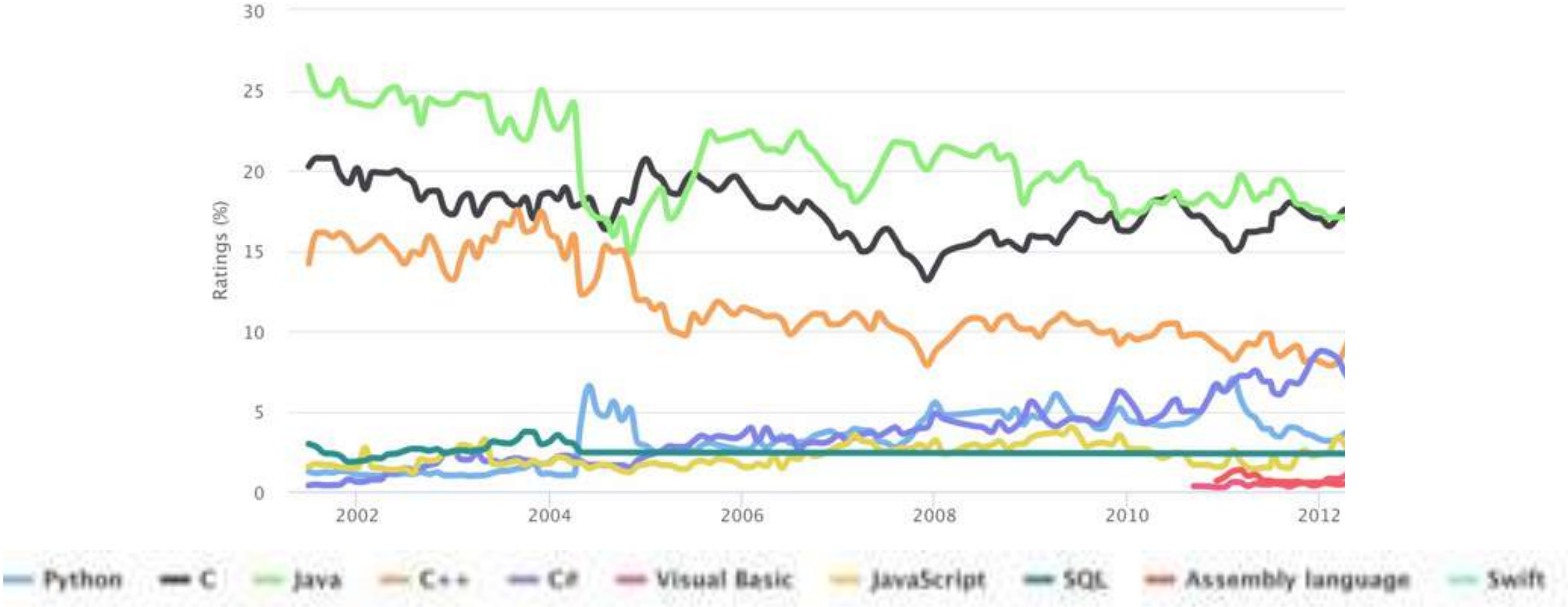
- **Efficient in Development.** Python is not only easy to learn and code, but it also accelerates the entire development process. It has a wide range of frameworks, packages, libraries, and modules that don't require you to do everything from scratch.
- **Extremely Versatile.** From small- to large-scale projects, Python works with the same efficiency. Apart from the uses mentioned above, developers use it for deep learning, data engineering, process automation, the Internet of Things (IoT), and more.
- **Demand for Python Developers.** The top companies using Python are Google, NASA, YouTube, Quora, IBM, HP, Qualcomm, and Dropbox. And they also hire Python developers frequently. In 2021, the average salary of Python developers in the US is $110,840 annually. So, learning Python can be rewarding for your career.
- **Supportive Community.** Python has a vast community of developers you can turn to in case of doubts or questions.

python

- Mudah Dimengerti
- Gratis!!!!
- Dynamic
- Multi Platform
  - Web Development
  - Mobile Apps
  - Desktop Apps
- Lagi Hype
  - Data Science
  - Robotics
  - Machine Learning
  - Data Analysis
  - Artificial Intelligent

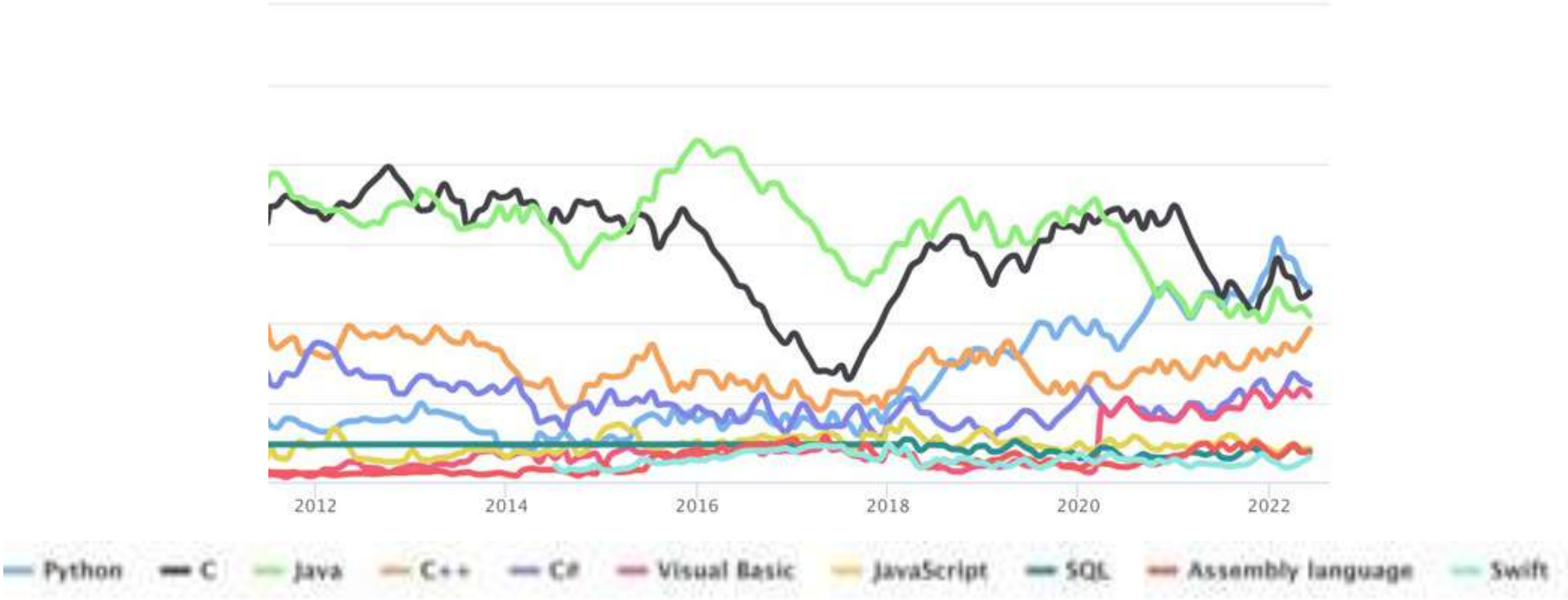
COMMUNITY INDEX

TIOBE Programming Community Index



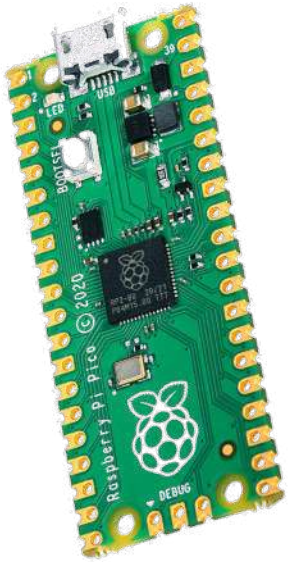
COMMUNITY INDEX

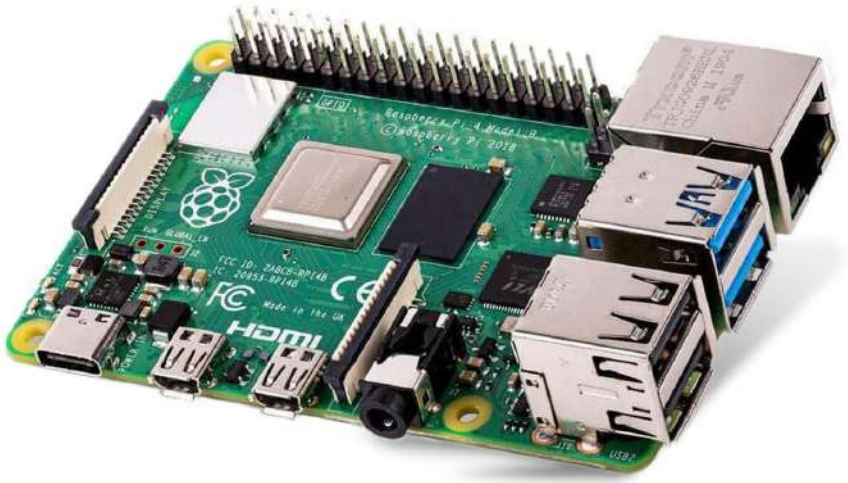
TIOBE Programming Community Index



MicroPython

ESP32





C++

```cpp
#include <iostream>

int main(int argc, char const *argv[])
{
    std::cout << "Hello World" << std::endl;
    return 0;
}
```

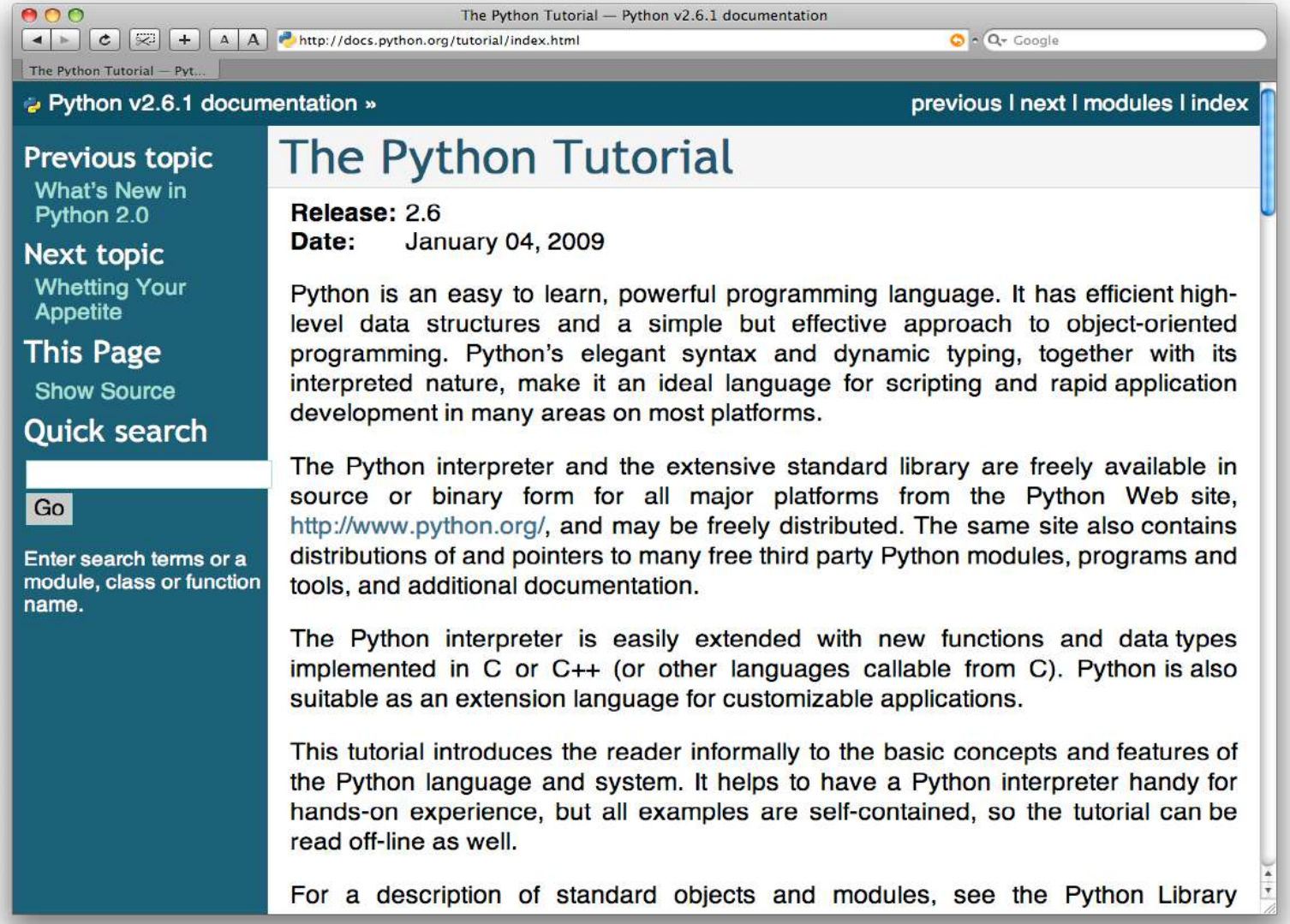
Java

```java
class Main{
    public static void main(String[] args) {
        System.out.println("Hello World");
    }
}
```

python

```python
print("Hello world")
```

THE PYTHON TUTORIAL IS GOOD



Apart from tutorials and guides, you can access Python-related podcasts, informational videos, latest events and news, developer community, success stories, FAQs from:

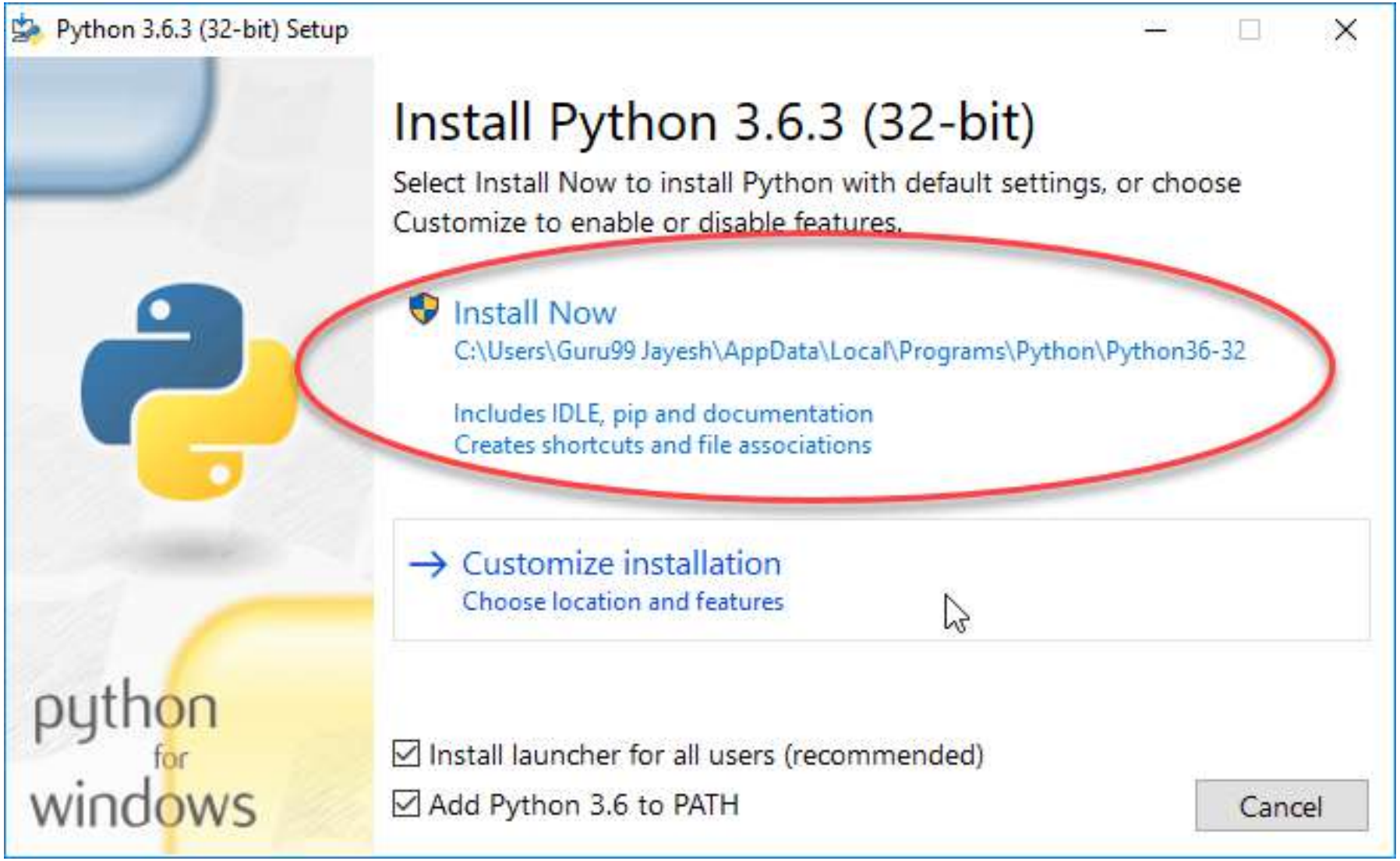
- Python.org
- Codecademy
- Udemy
- Coursera
- Learnpython.org
- FreeCodeCamp
- DataCamp
- eDx
- Google's Python Class
- Simplilearn
- SoloLearn
- Tutorials Point
- W3Schools

CHAPTER 2

RUNNING PYTHON

To download and install Python, visit the official website of Python https://www.python.org/downloads/ and choose your version. We have chosen Python version 3.6.3

Install Python



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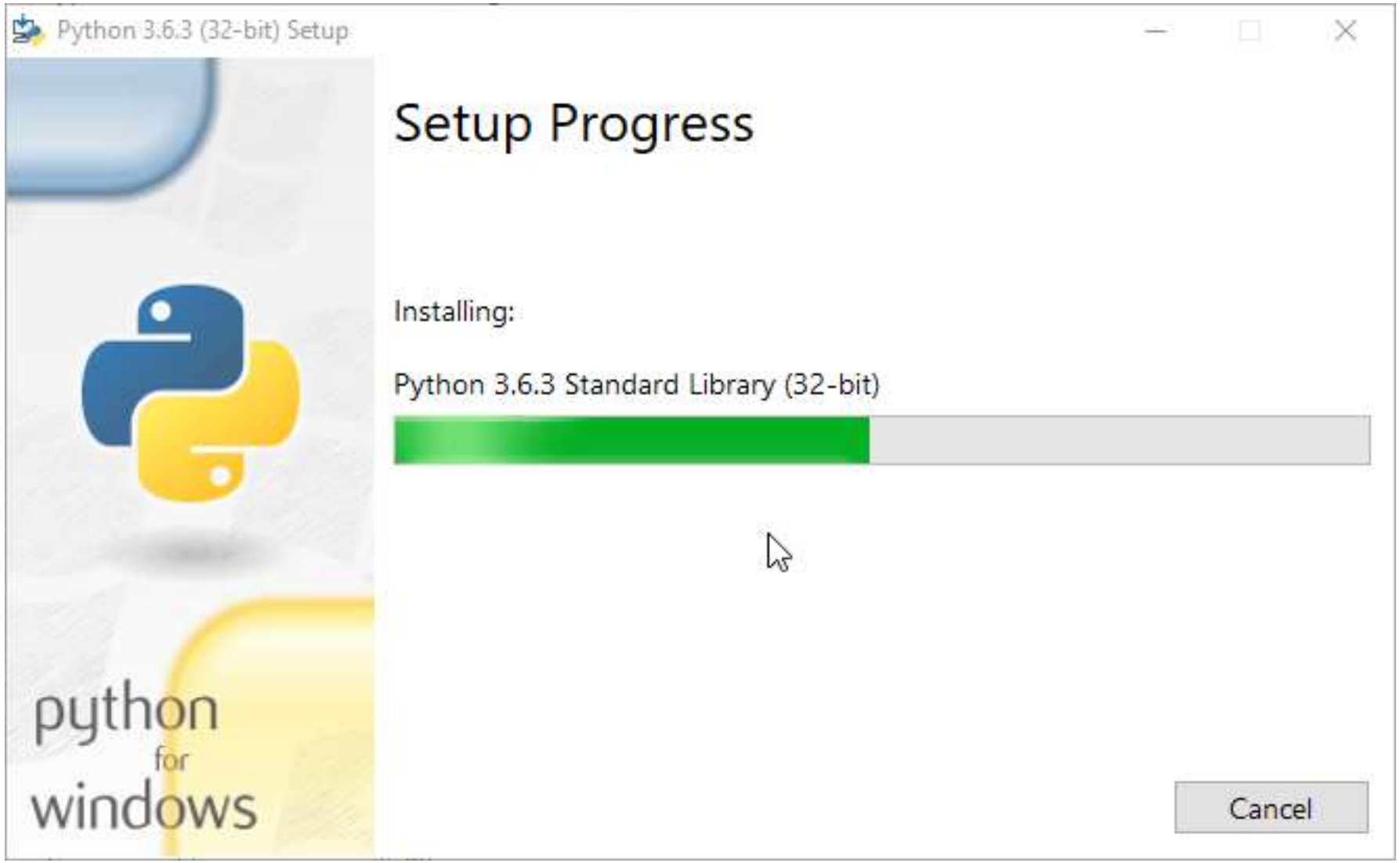
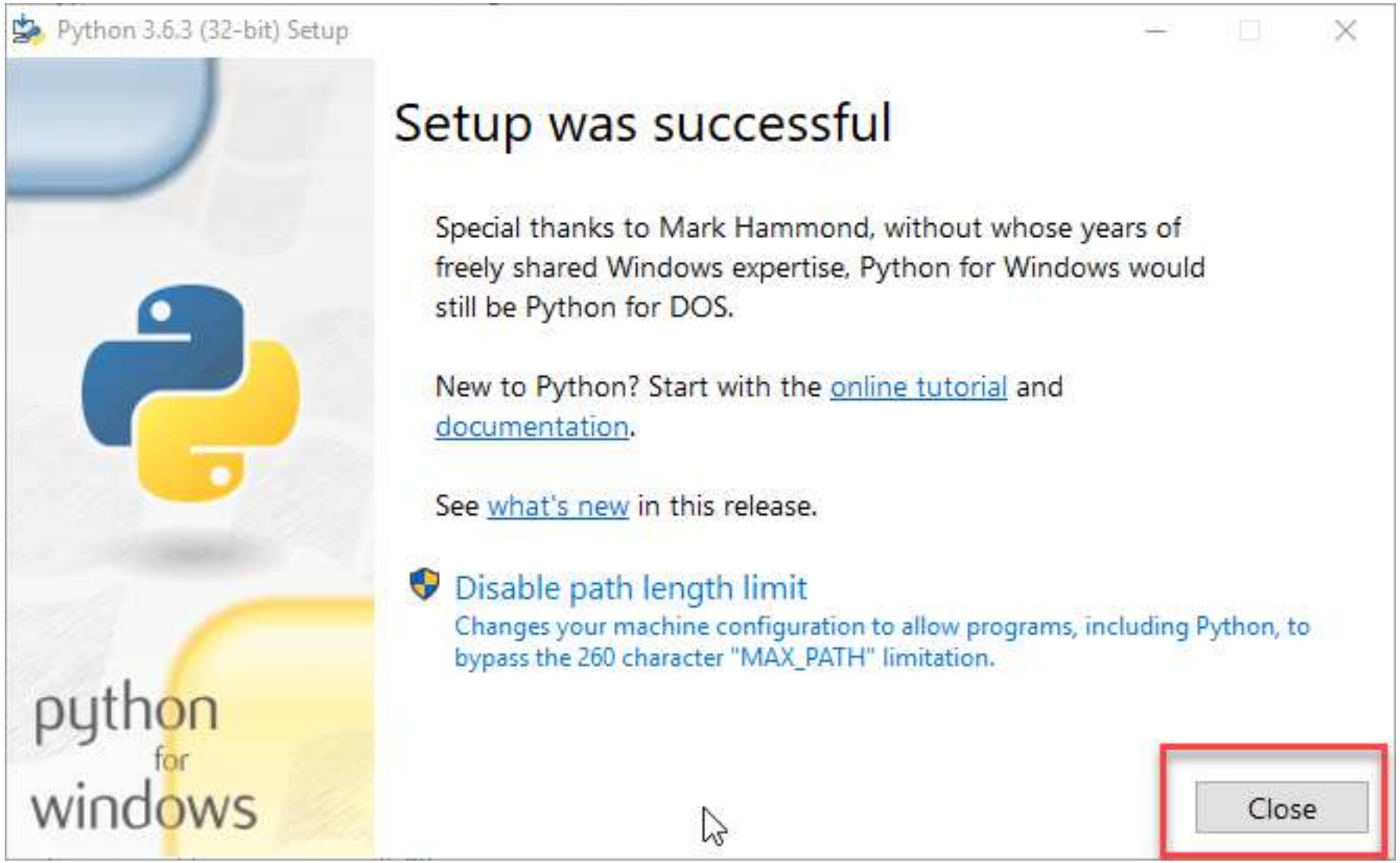
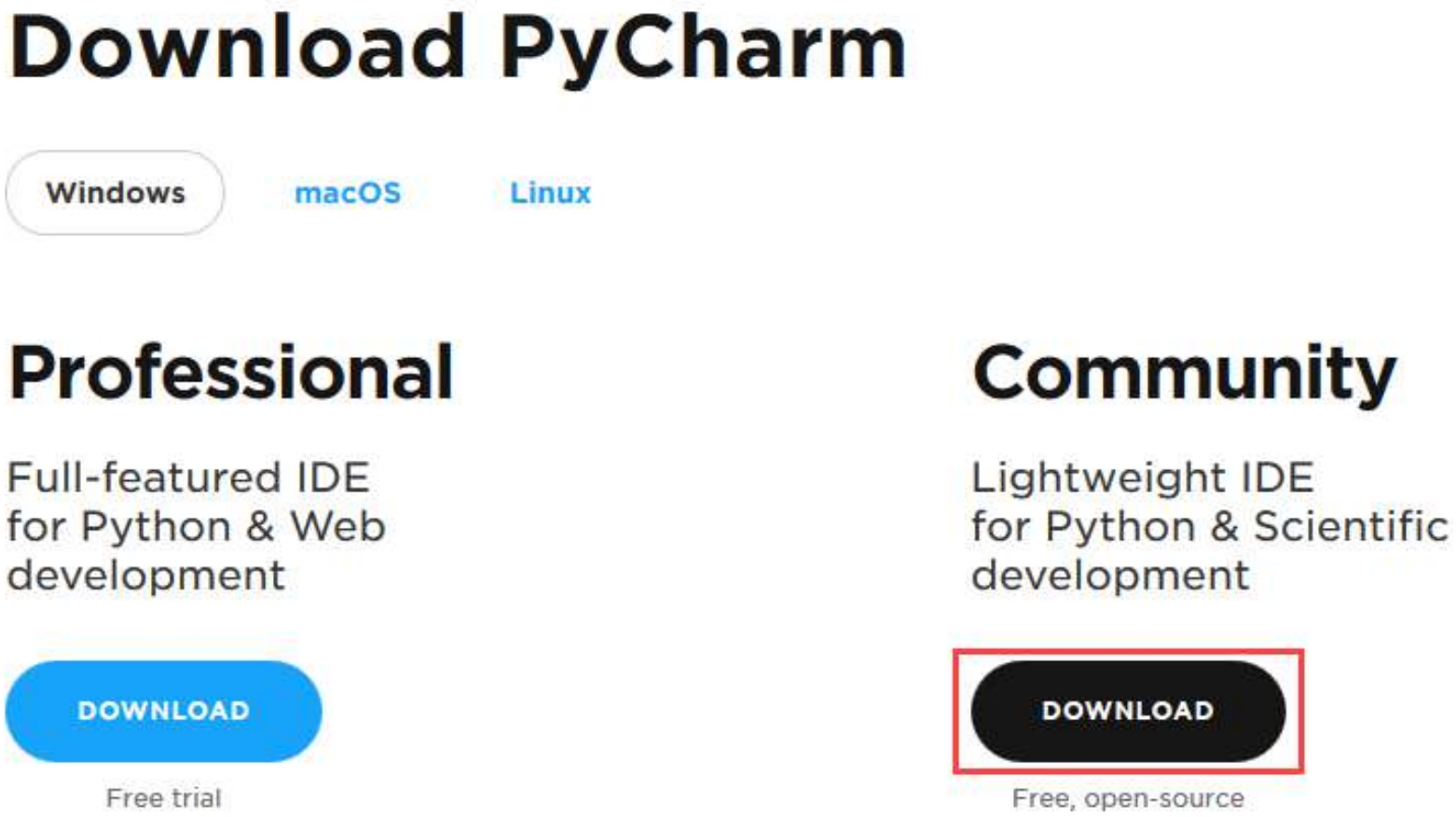


Install Python

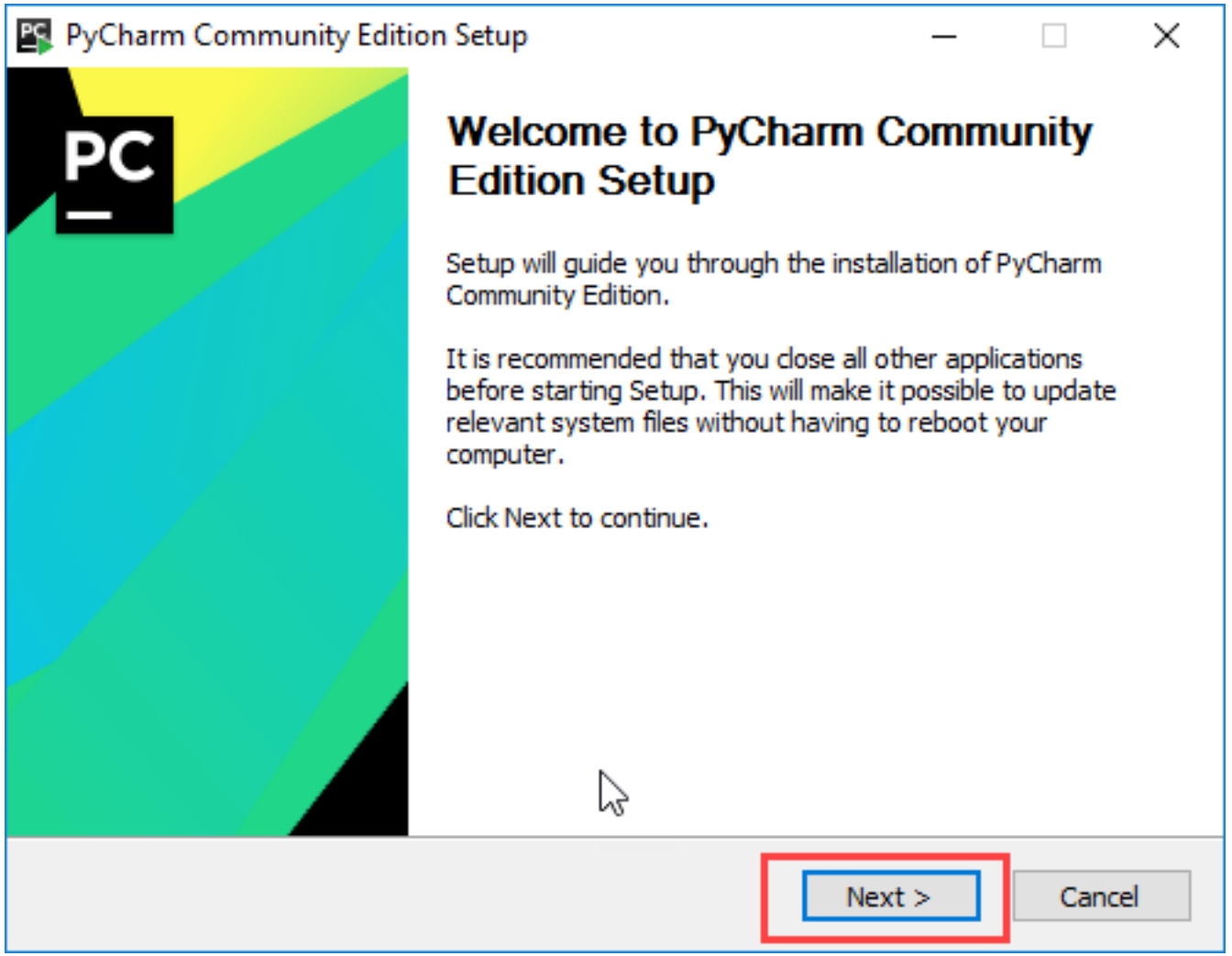


Install PyCharm



To download PyCharm visit the website https://www.jetbrains.com/pycharm/download/ and Click the “DOWNLOAD” link under the Community Section.

Install PyCharm



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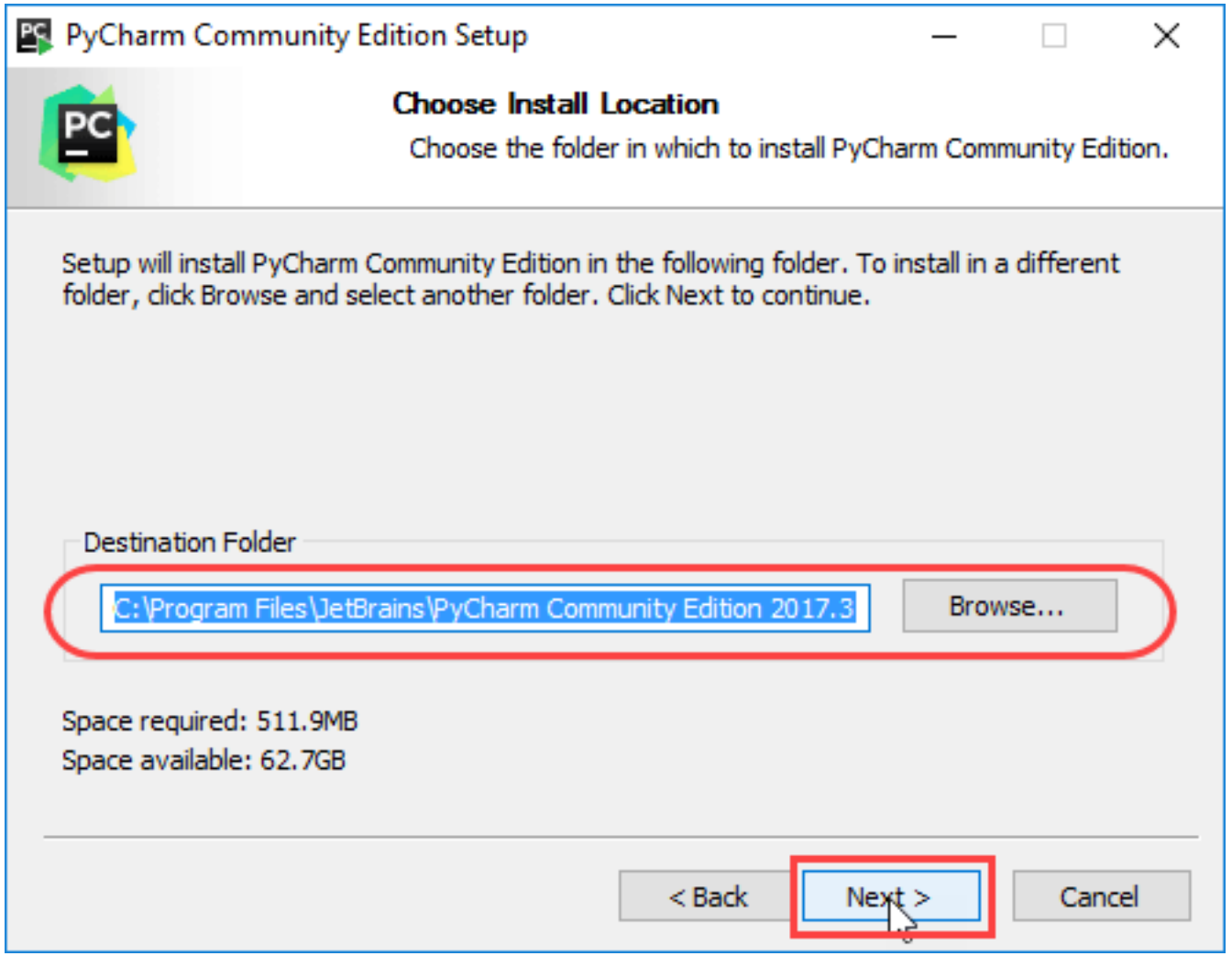

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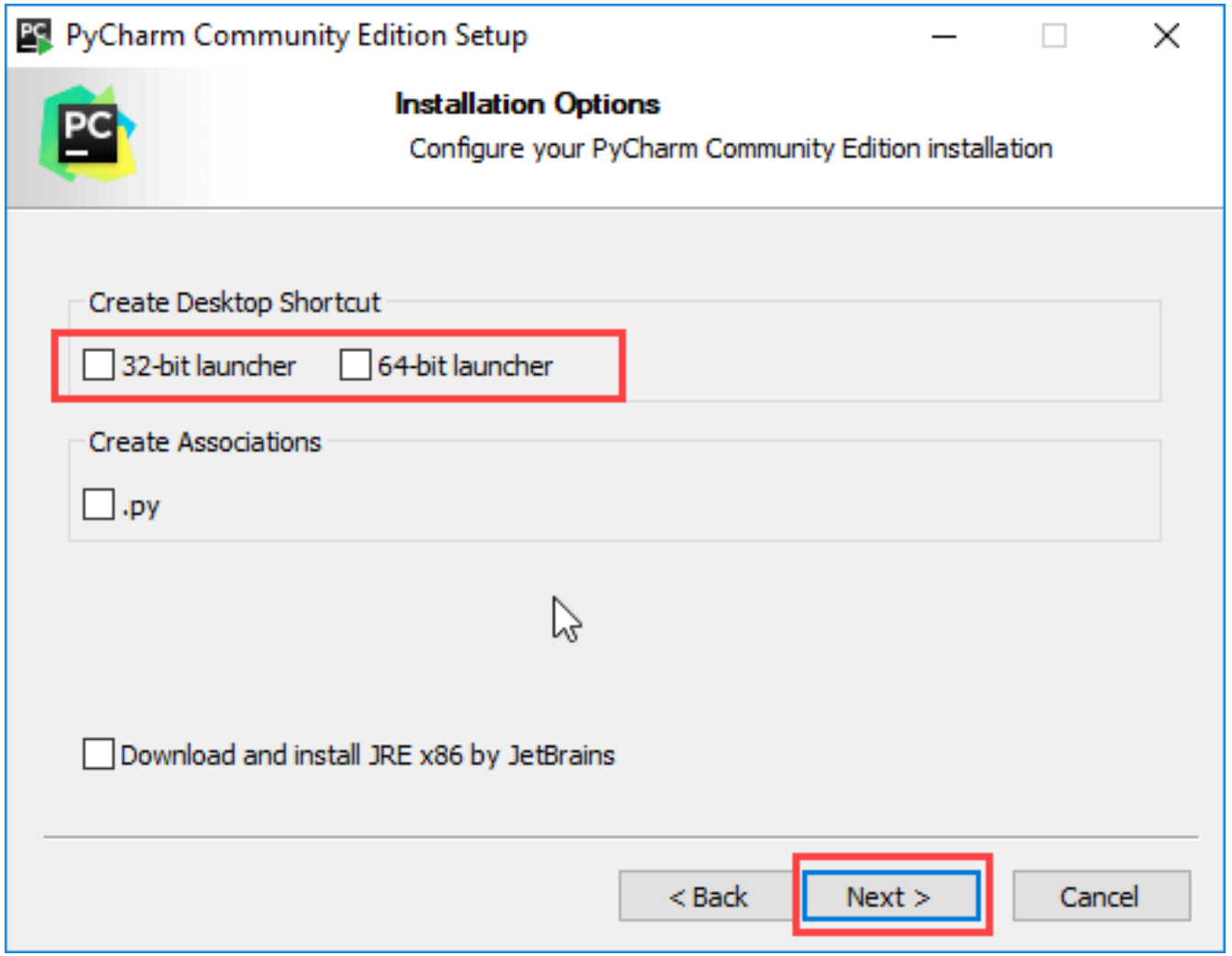

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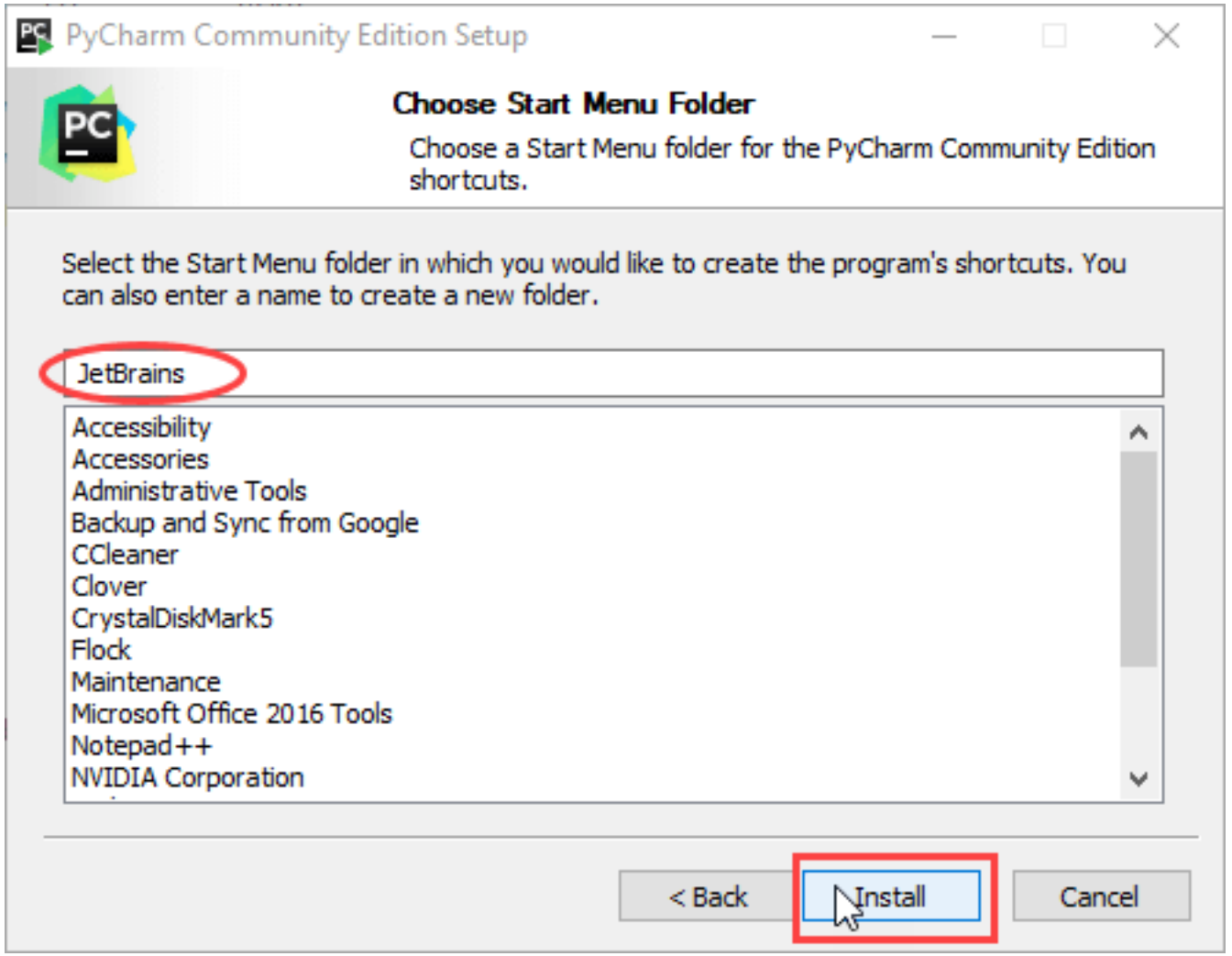

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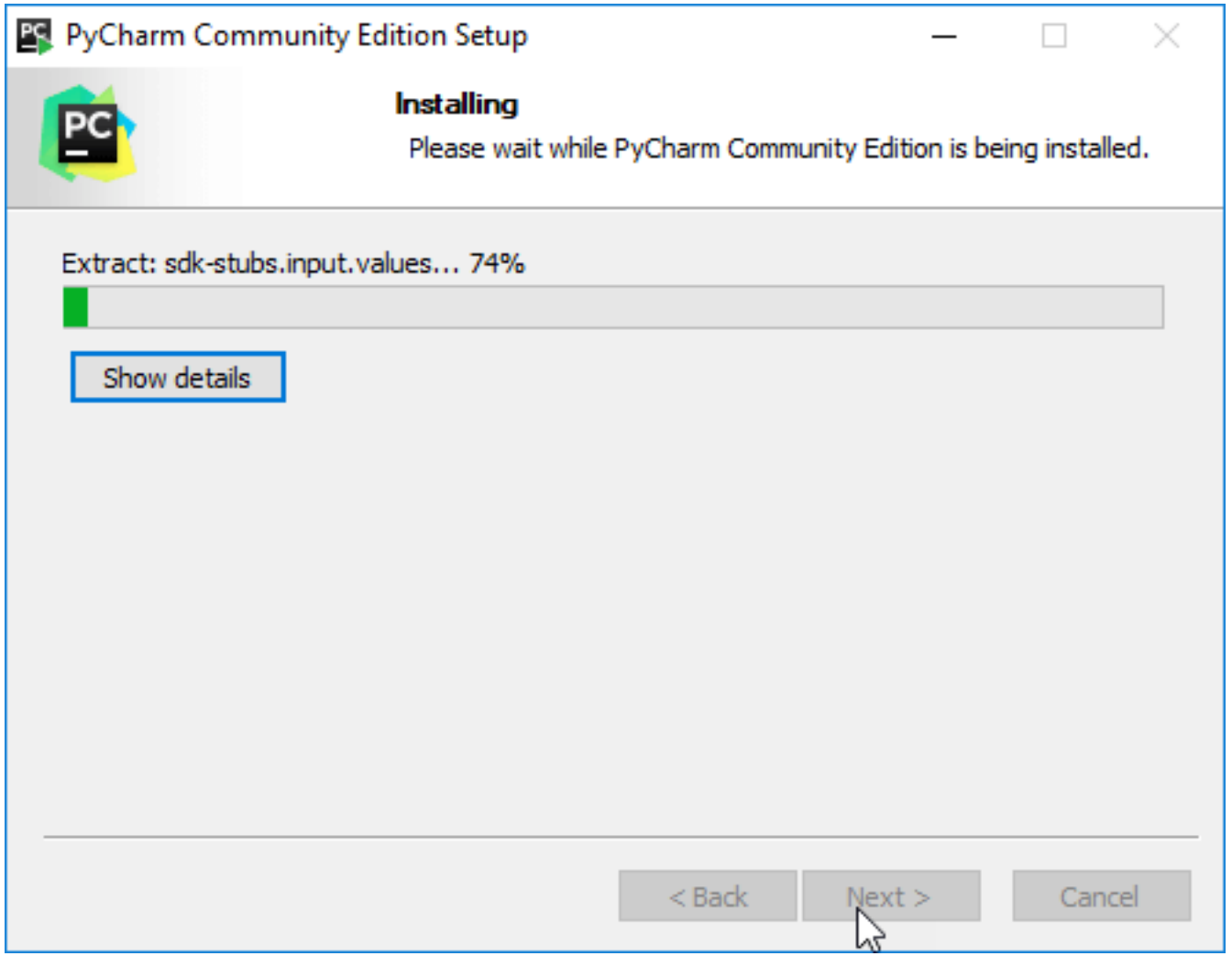

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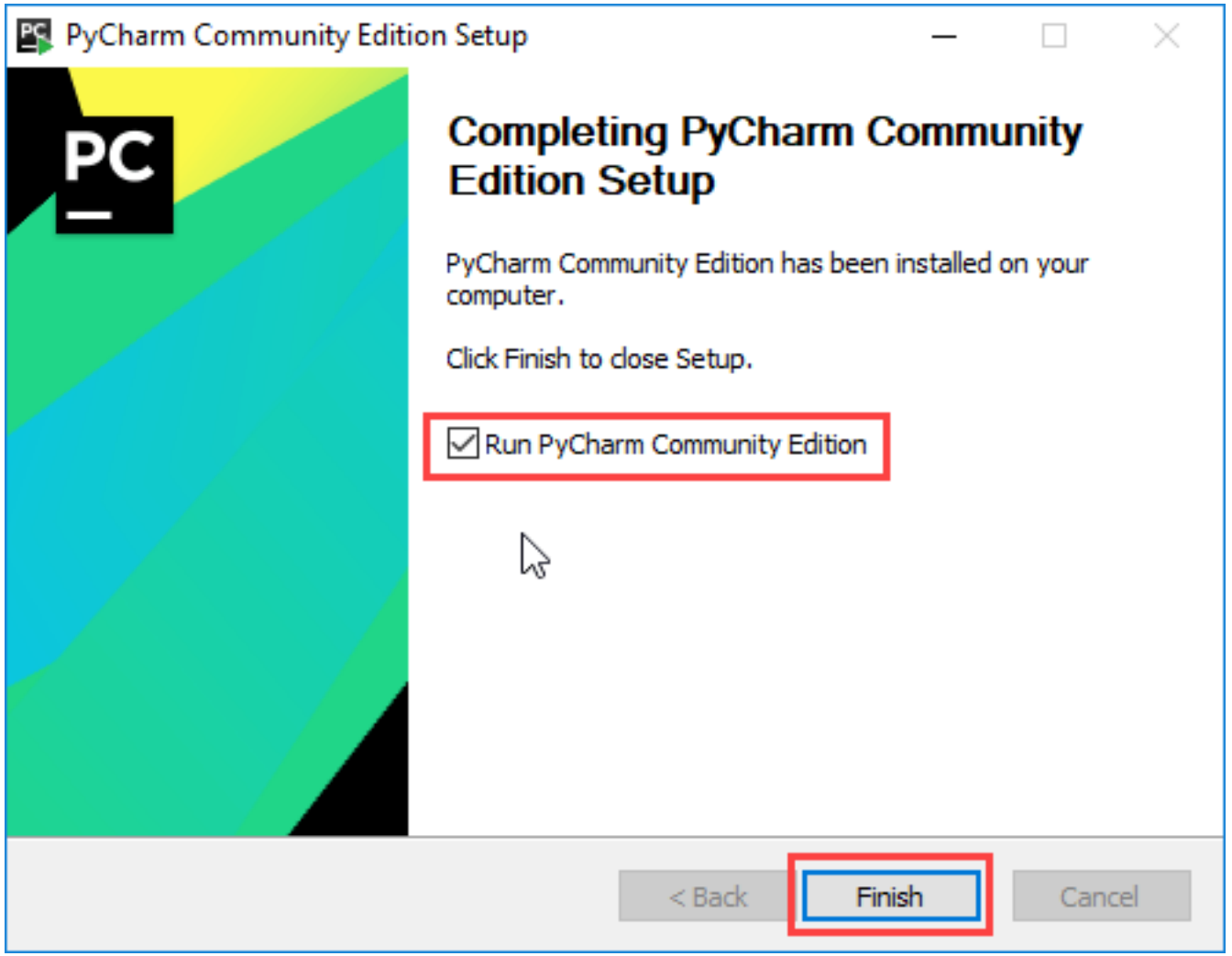

Congratulation, the power of AI is in the palm of your hand

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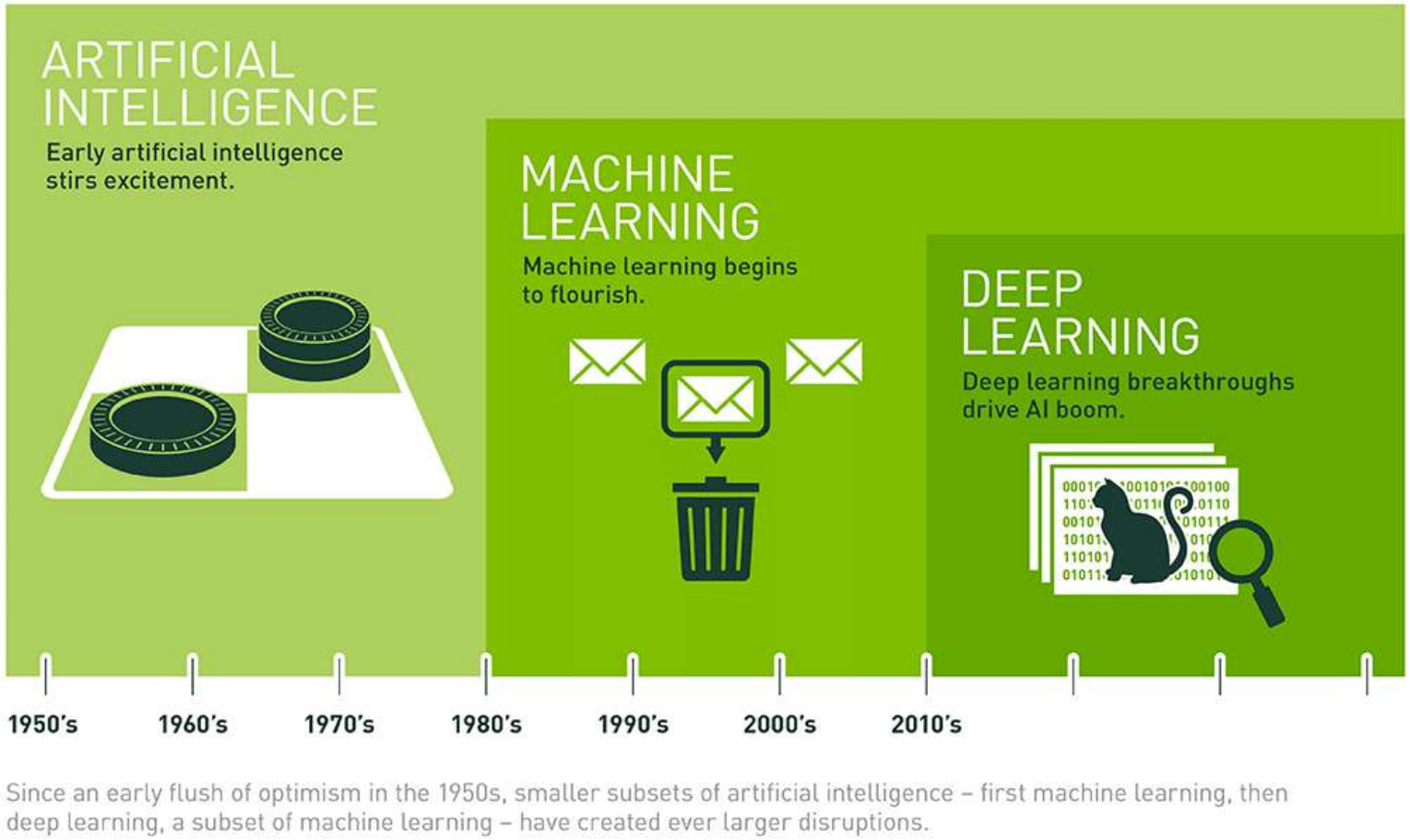
CHAPTER 3

ARTIFICIAL INTELLIGENCE

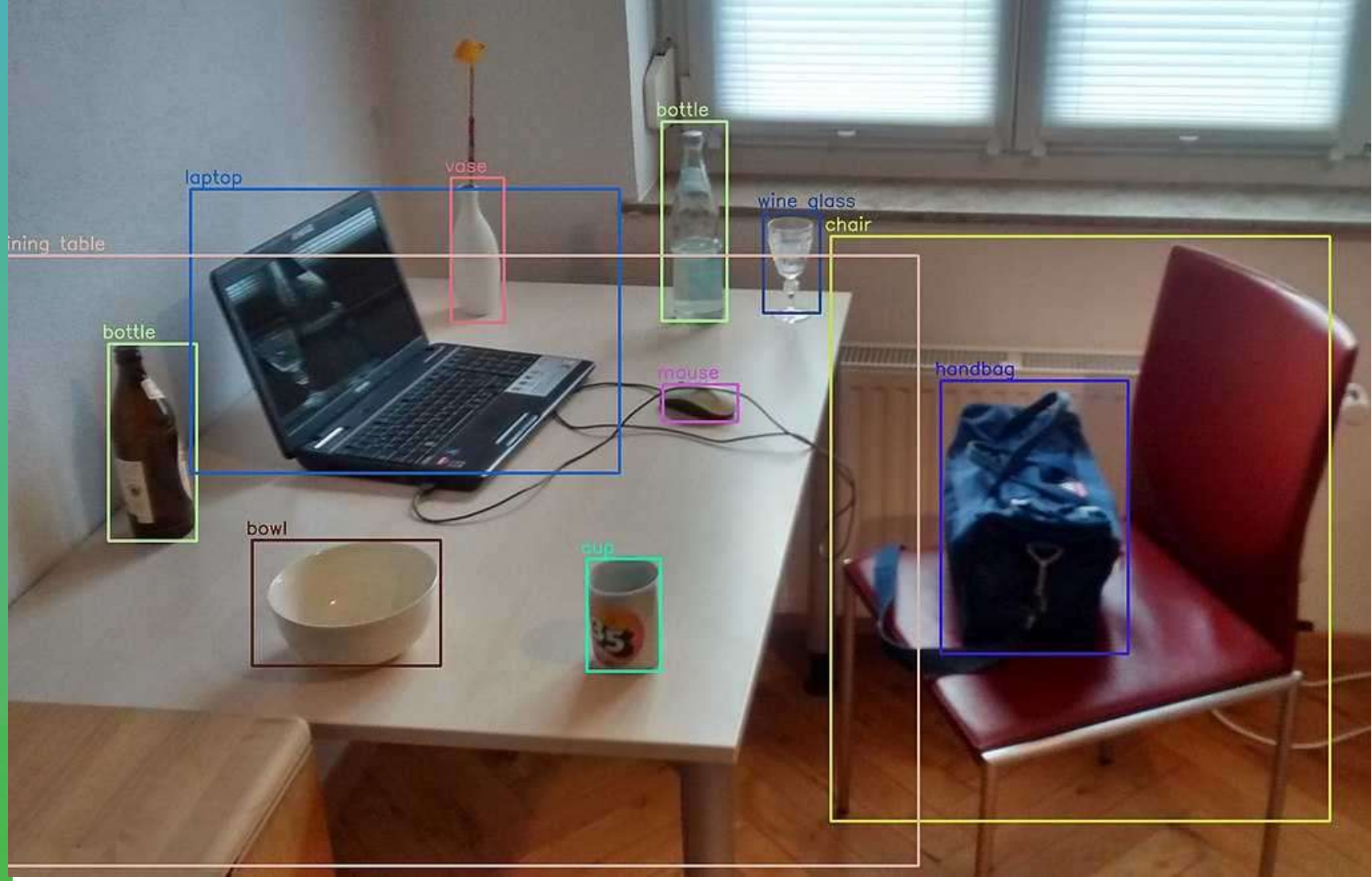


Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Source: https://blogs.nvidia.com/wp-content/uploads/2016/07/

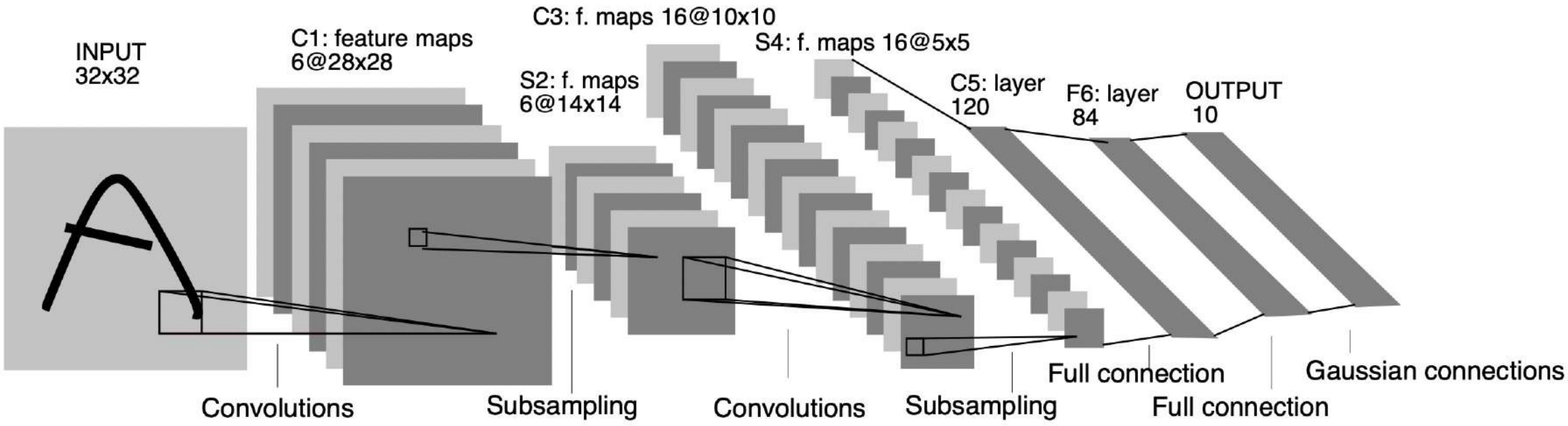
THE POWERFUL LIBRARY

DEVELOPING CV AND AI WITH PYTHON



There are clear trade-offs between traditional CV and deep learning-based approaches. Classic CV algorithms are well-established, transparent, and optimized for Page 7 performance and power efficiency, while DL offers greater accuracy and versatility at the cost of large amounts of computing resources.

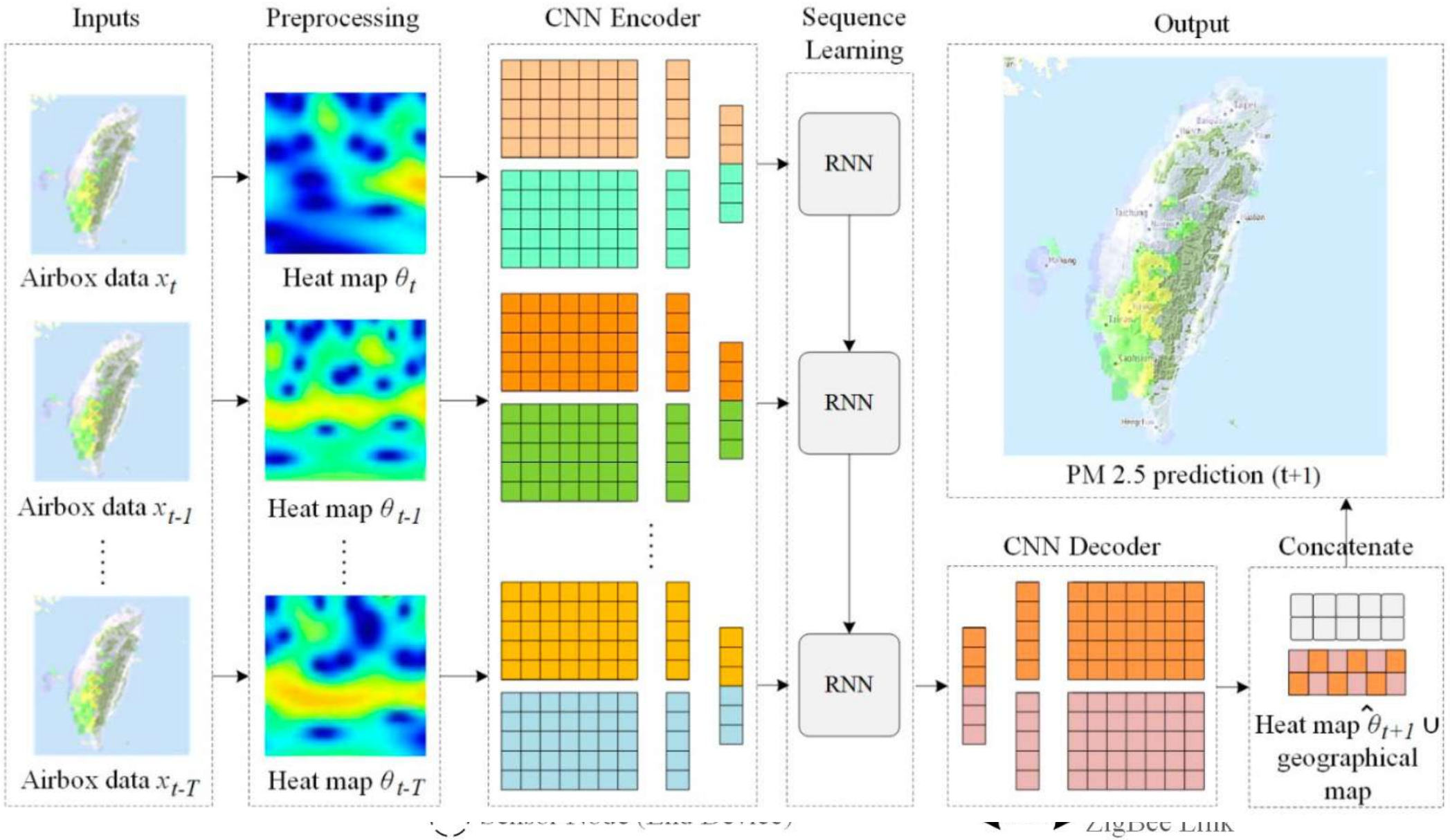
DEEP LEARNING

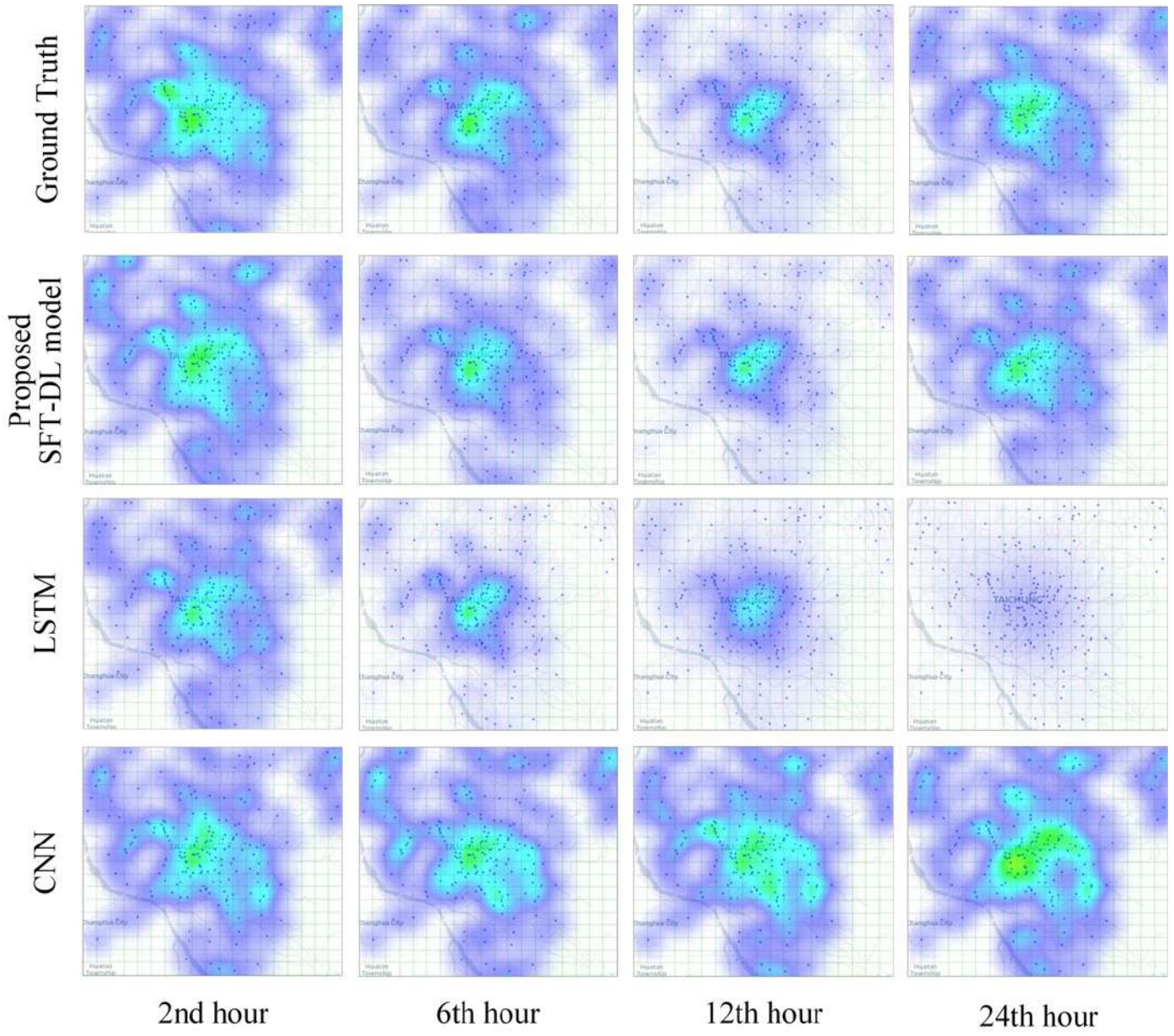


Architecture of the first CNN ‘LeNet-5’ Network by YanLe Cunn et. al.

CHAPTER 4: REAL-WORLD APPLICATIONS

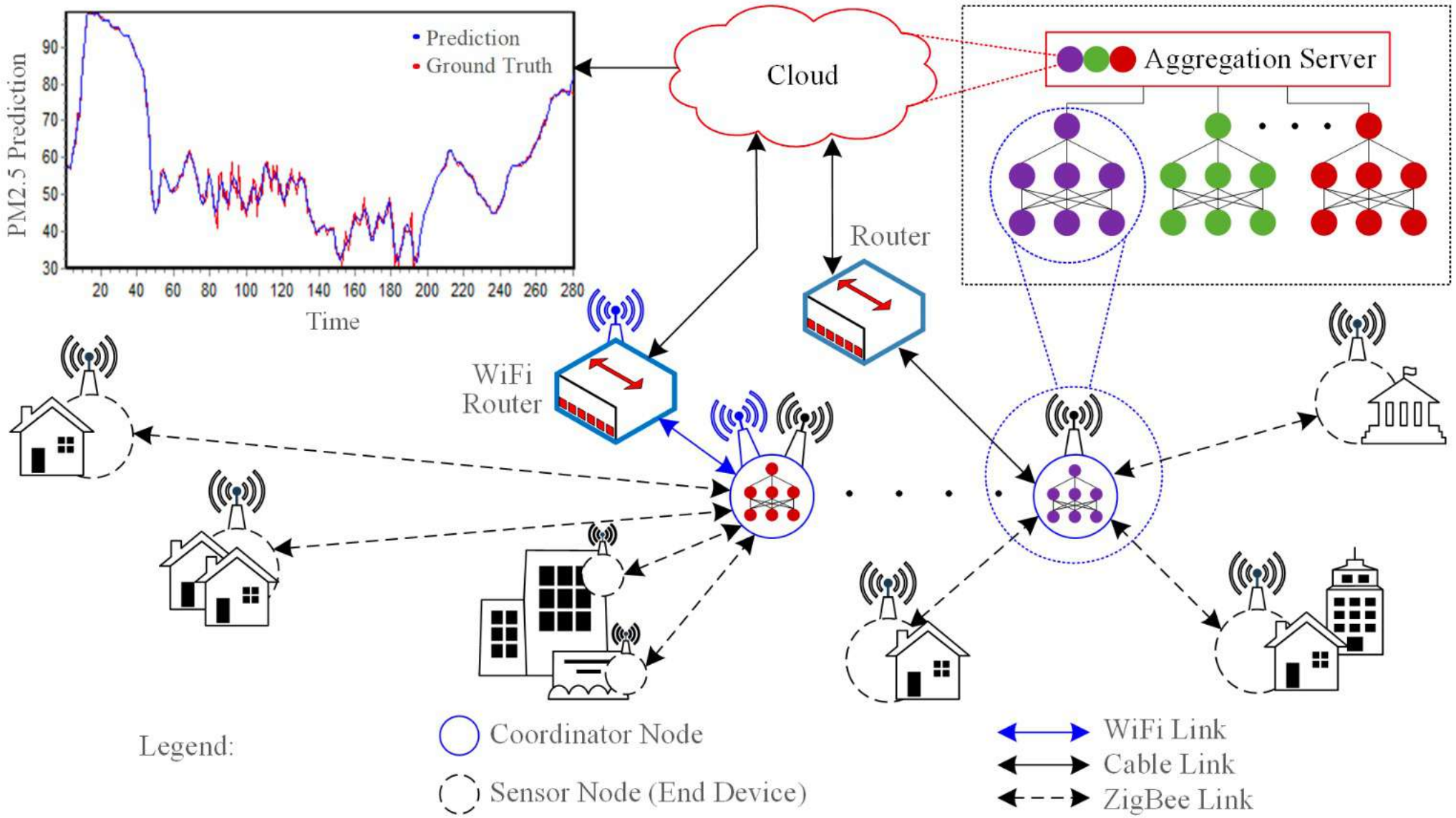
- "A Systematic Review of Federated Learning in the Healthcare Area: From the Perspective of Data Properties and Applications," Applied Sciences. (**Biomedical Engineering,** Q2, IF 2.679)
- "A Novel Prediction Approach for Exploring PM2. 5 Spatiotemporal Propagation Based on Convolutional Recursive Neural Networks," Journal of Internet Technology. (**Image Processing,** Q3, IF 1.005)
- "COVID-19 Related Web Search Behavior: An Analytical Study of Google Trends-based Query Volumes in Indonesia," Journal of Consumer Health on the Internet. (**Healthcare,** Q4, IF 0.389)
- "Modeling Traffic Congestion with Spatiotemporal Big Data for An Intelligent Freeway Monitoring System," Test Engineering and Management (**Transportation Management,** Q4, IF 0.341)

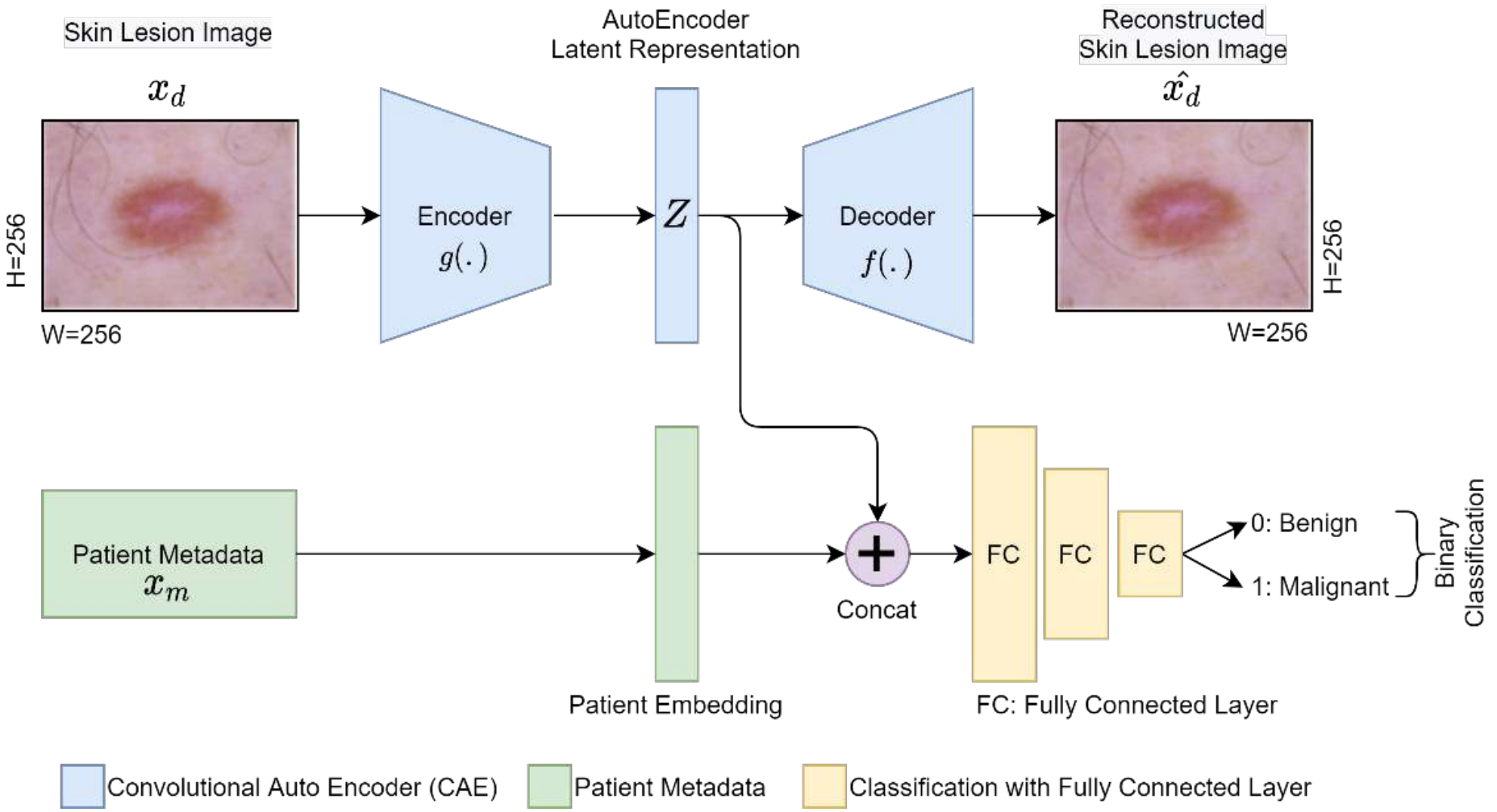

Inputs
Preprocessing
CNN Encoder
Sequence Learning
Output
Airbox data x_t
Heat map θ_t
RNN
Airbox data x_{t-1}
Heat map θ_{t-1}
RNN
PM 2.5 prediction (t+1)
CNN Decoder
Concatenate
Airbox data x_{t-T}
Heat map θ_{t-T}
RNN
Heat map $\hat{\theta}_{t+1}$ ∪ geographical map

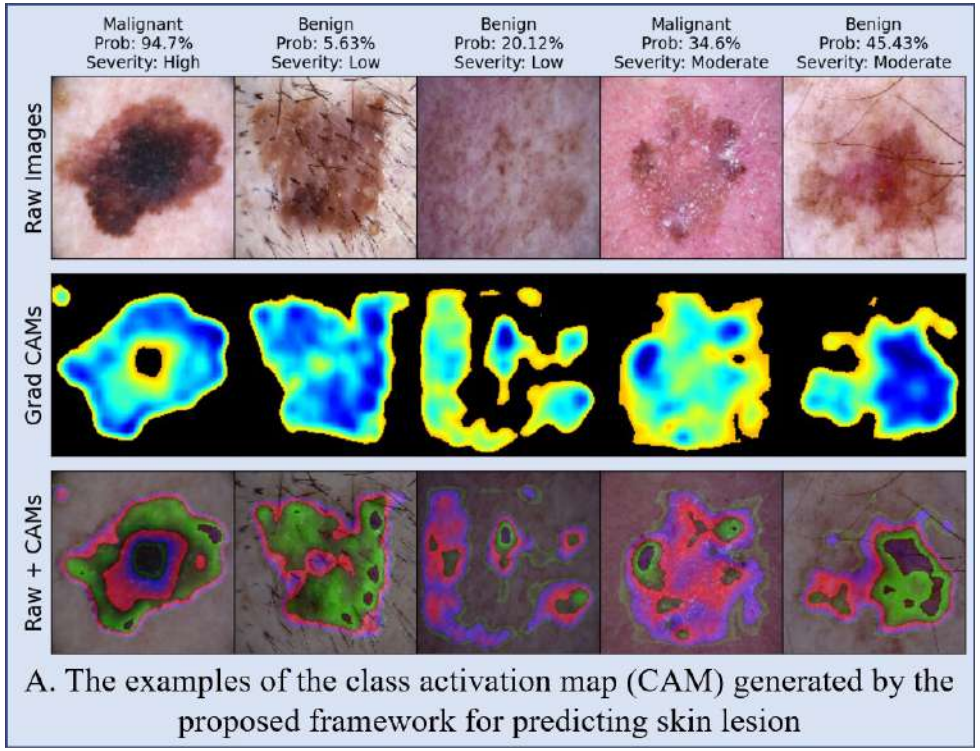

Ground Truth
Proposed SFT-DL model
LSTM
CNN
2nd hour
6th hour
12th hour
24th hour

REAL-WORLD APPLICATIONS

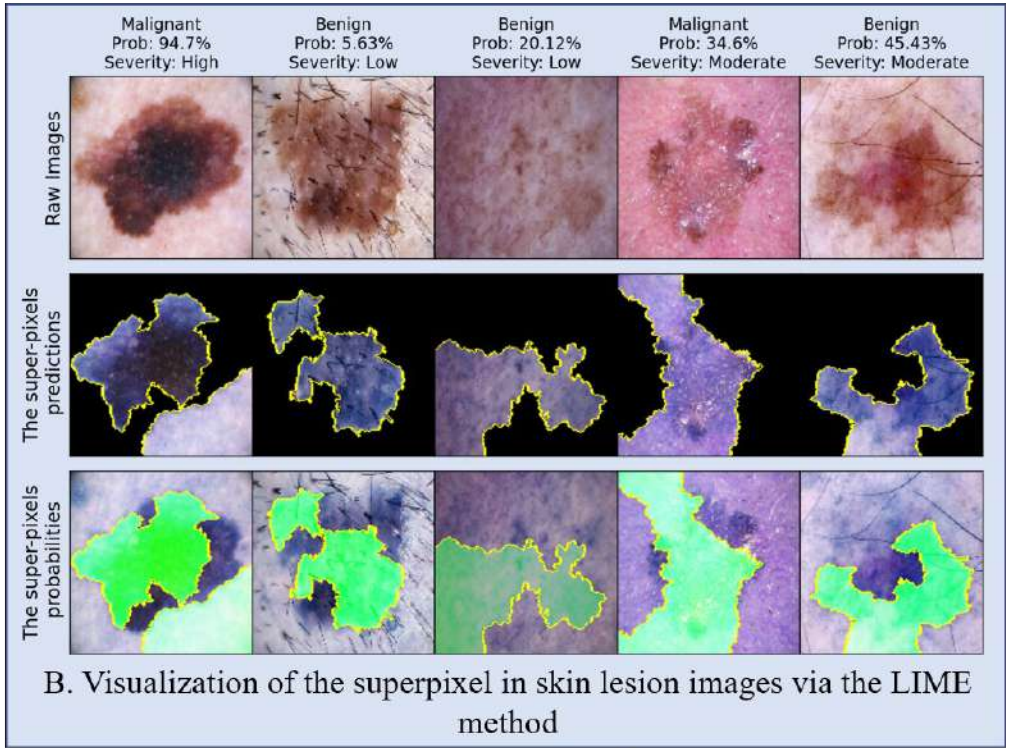
- "Pulse-Line Intersection Method with Unboxed Artificial Intelligence for Hesitant Pulse Wave Classification," Information Processing and Management. (**Medical Signal Processing,** Q1, IF 6.222)
- "A spatiotemporal data compression approach with low transmission cost and high data fidelity for an air quality monitoring system," Future Generation Computer Systems," (**Wireless Sensor Network,** Q1, IF 6.125)
- "Federated Compressed Learning Edge Computing Framework with Ensuring Data Privacy for PM2.5 Prediction in Smart City Sensing Applications," Sensors 2021. (**Environmental Sensing,** Q1, IF 3.576)
- "Week-Wise Student Performance Early Prediction in Virtual Learning Environment Using a Deep Explainable Artificial Intelligence," Applied Sciences. (**Engineering Education,** Q2, IF 2.679)


PM2.5 Prediction
Prediction
Ground Truth
Time
Cloud
Aggregation Server
Router
WiFi
Router
Legend:
Coordinator Node
Sensor Node (End Device)
WiFi Link
Cable Link
ZigBee Link

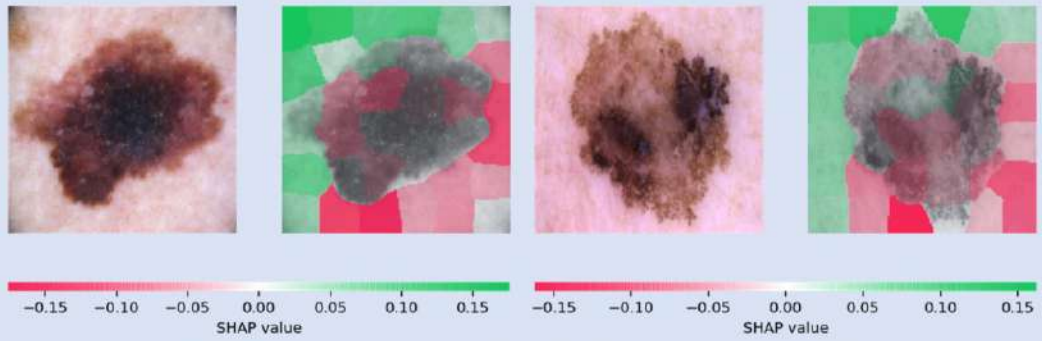

Skin Lesion Image
x_d
H=256
W=256
AutoEncoder
Latent Representation
Encoder
$g(.)$
Z
Decoder
$f(.)$
Reconstructed
Skin Lesion Image
$\hat{x}_d$
H=256
W=256
Patient Metadata
x_m
Patient Embedding
Concat
FC
FC
FC
0: Benign
1: Malignant
Binary
Classification
FC: Fully Connected Layer
Convolutional Auto Encoder (CAE)
Patient Metadata
Classification with Fully Connected Layer



A. The examples of the class activation map (CAM) generated by the proposed framework for predicting skin lesion



B. Visualization of the superpixel in skin lesion images via the LIME method



C. SHAP values illustrate the skin lesion image prediction

THANK YOU

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