Digital Image Processing

IT 254
Practical

Initial Discussion

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Initial Discussion

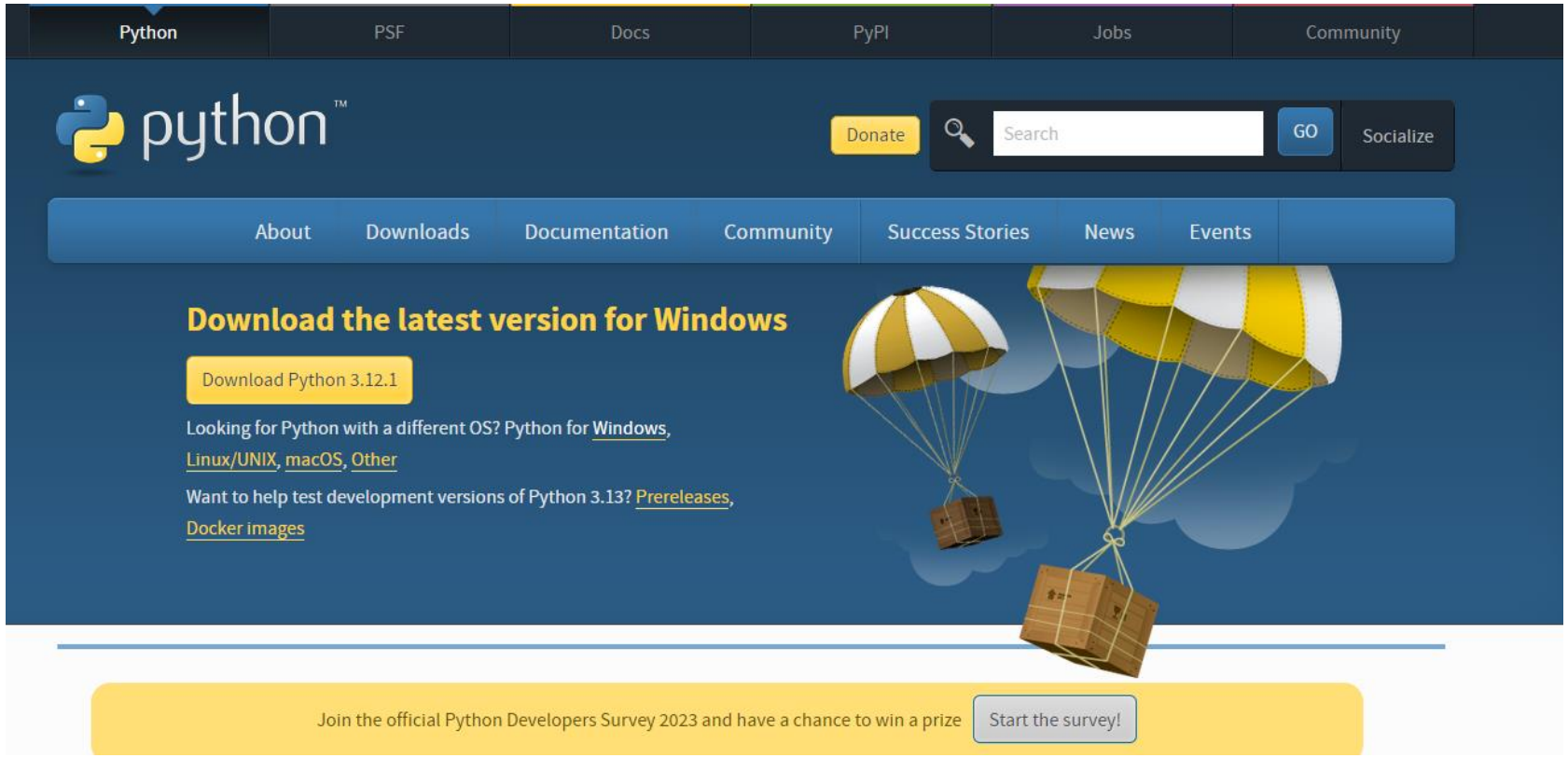
- Discuss the content that will be covered in practical classes
- Installing Python, Anaconda, and OpenCV – How to Install?
- About the projects and topics

Need to prepare the following before Day 01:

- Download and install Python
- Download and Install Anaconda
- Install OpenCV in Anaconda
- Refresh your memory on the following:
  - Basic Python
  - Input / Output
  - Operators
  - Data Types

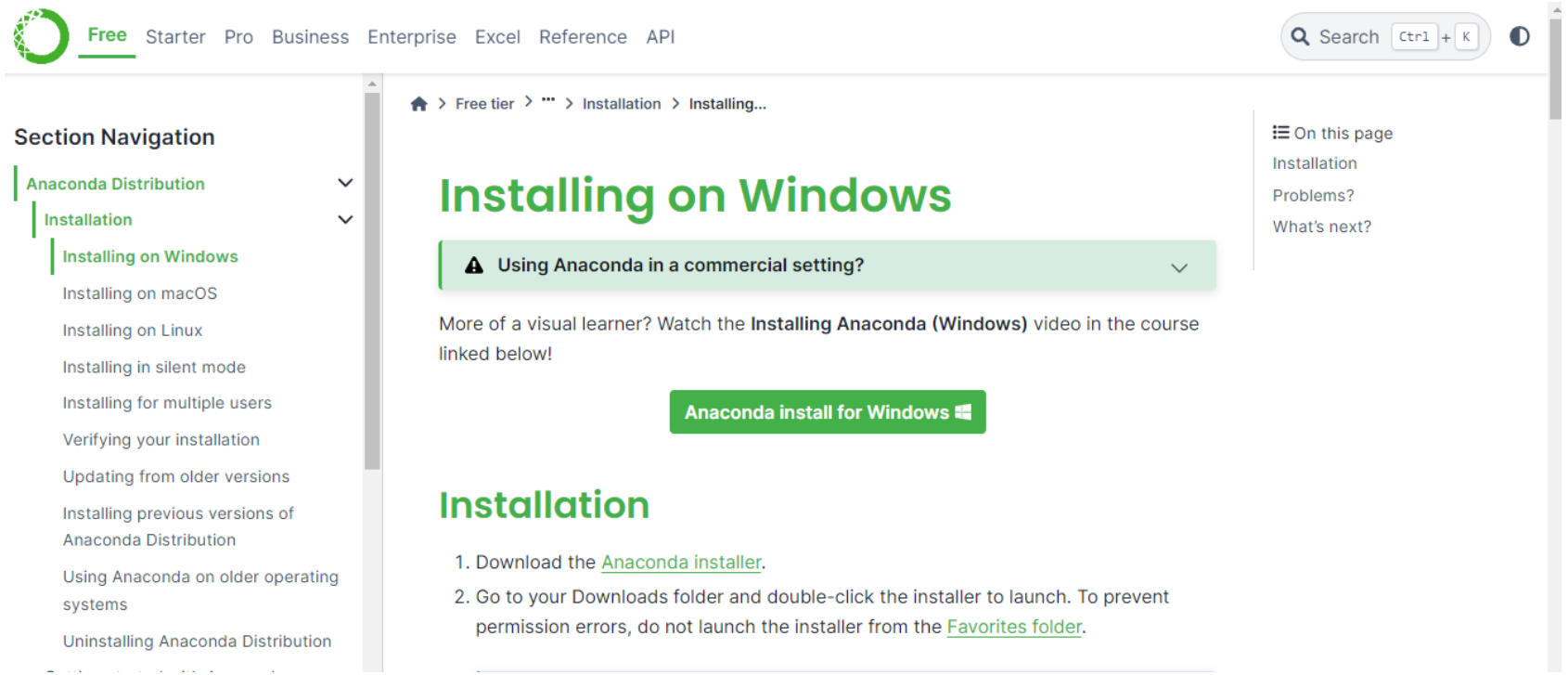
Download and install Python

- Download Python : https://www.python.org/downloads/

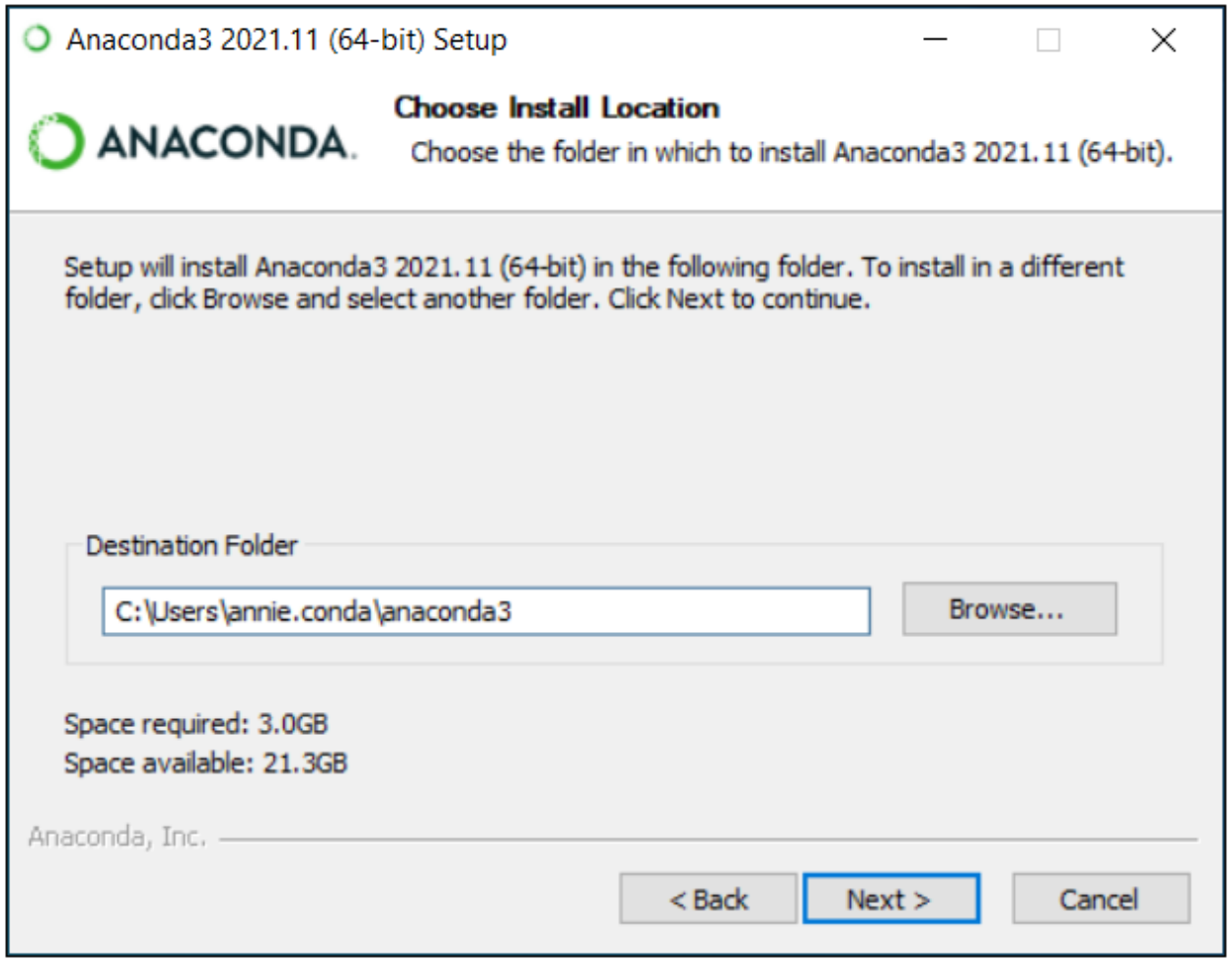


Download Anaconda

- Download Anaconda: https://docs.anaconda.com/free/anaconda/install/windows/



Install Anaconda

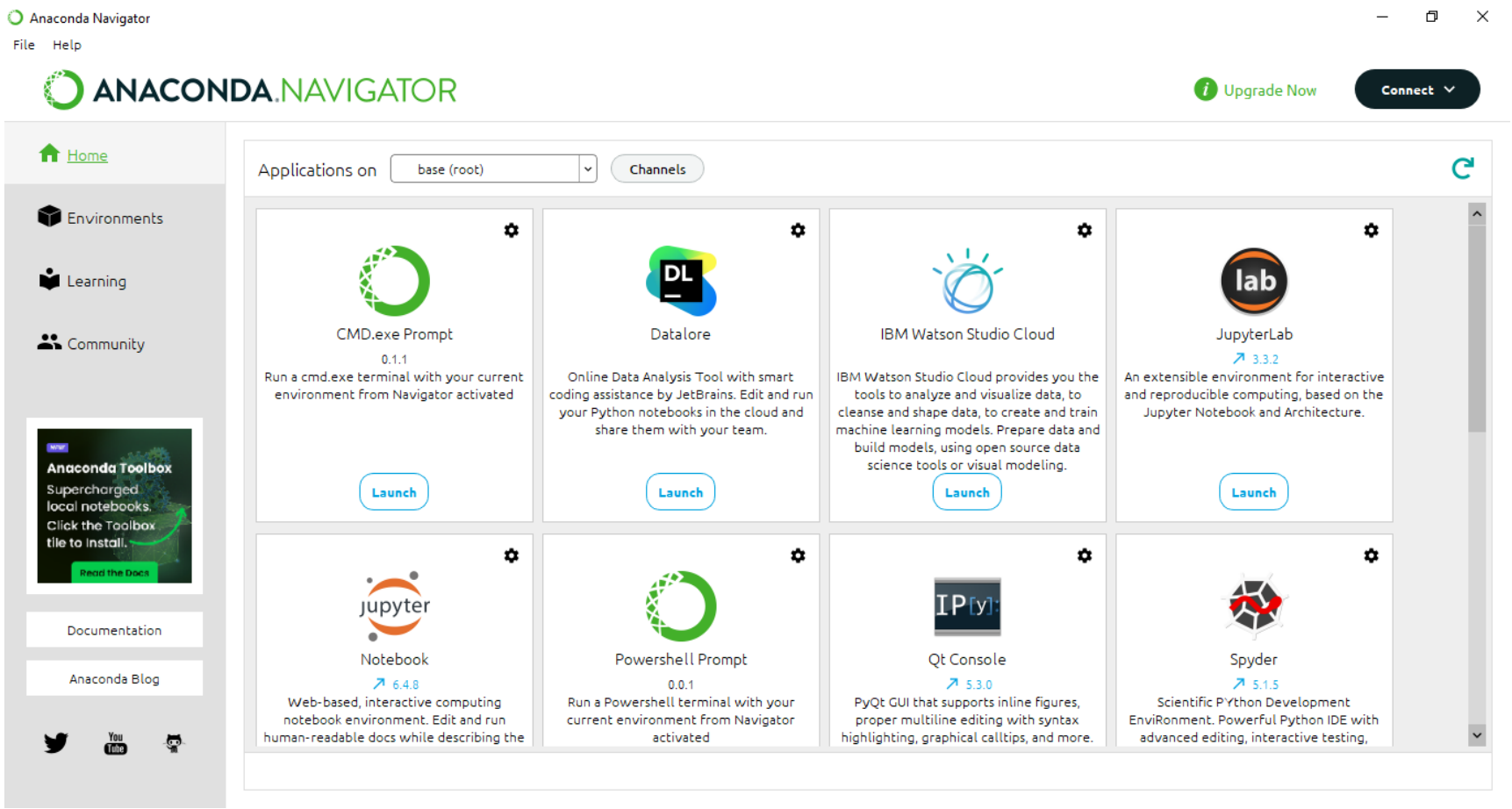


Anaconda Environment

Creating Anaconda Environment :

- Step 1:- Search Anaconda in your taskbar and select ANACONDA NAVIGATOR.
- Step 2:- Now you will see a menu with various options like Jupiter notebook , Spyder etc. This is Anaconda Environment.
- Step 3:- Select Spyder as it is Anaconda’s IDE for python and OpenCV library will work in it.

Anaconda Environment



Install OpenCV in Anaconda

- Step 1:- After installing the anaconda open the Anaconda Prompt.
- Step 2:- Type the given command, press enter, and let it download the whole package.

Command :

```
conda install -c menpo opencv
```

- Step 3:- Now simply import OpenCV in your python program in which you want to use image processing functions.

Session 01: Introduction to Python

- Functions
- Data Structures
  - Lists
  - Dictionaries
  - Tuple
  - Set
  - String
  - Byte Array
- Object Oriented Programming Concepts
- Exception Handling *
- File Handling *

Need to prepare the following before Day 02:

- Getting Started with OpenCV
- Installing OpenCV in Anaconda

Session 02: Image Processing Part I

- Reading/ Displaying/Writing/ Saving an image
- Color space
- Arithmetic operations on an image
- Bitwise operations on image
- Image Resizing *
- Eroding/ Blurring
- Border around an image
- Gray scaling *
- Scaling/ Rotating/ Shifting and Edge Detection *
- Erosion/ Dilation of an image *

Session 03: Image Processing Part II

- Analyzing an image using histogram
- Thresholding
- Segmentation
- Convert color space of an image
- Filter Color
- Bilateral filtering *
- Image registration
- Background subtraction *
- Foreground Extraction *

Session 04: Feature Detection

- Line Detection *
- Circle Detection *
- Detecting Corners of an image *
- Detecting Circles and Ellipses in an image *
- Document field detection *
- Smile detection *

Session 05: Drawing Functions, Video Processing

- Draw a line/ circle/ ellipse/ rectangle
- Drawing a text string
- Find and draw contours *
- Triangle with centroid
- Playing a video *
- Creating a video using multiple images *
- Extract images form video *

Simple OpenCV Project Ideas

- License Plate Recognition
- Hand Gesture Recognition
- Handwriting Recognition
- Plant Disease Identification
- Kidney Stone Identification
- Signature Verification
- Sign Language Detection