



Nama: **A. Edwin Krisandika Putra (122140003)** Tugas Ke: **Worksheet 1: Setup Python Environment untuk Multimedia**

Mata Kuliah: **Sistem Teknologi Multimedia (IF25-40305)**

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1 Tujuan Pembelajaran

Setelah menyelesaikan worksheet ini, mahasiswa diharapkan mampu:

- Memahami pentingnya manajemen environment Python untuk pengembangan multimedia
- Menginstall dan mengkonfigurasi Python environment menggunakan conda, venv, atau uv
- Menginstall library-library Python yang diperlukan untuk multimedia processing
- Memverifikasi instalasi dengan mengimpor dan menguji library multimedia
- Mendokumentasikan proses konfigurasi dan hasil pengujian dalam format $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

2 Latar Belakang

Python telah menjadi bahasa pemrograman yang sangat populer untuk multimedia processing karena memiliki ekosistem library yang sangat kaya. Namun, untuk dapat bekerja dengan multimedia secara efektif, kita perlu mengatur environment Python dengan benar dan menginstall library-library yang tepat.

Manajemen environment Python sangat penting untuk:

- Menghindari konflik antar library (dependency conflict)
- Memastikan reproducibility dari project
- Memudahkan kolaborasi antar developer
- Memisahkan project yang berbeda dengan requirement yang berbeda

3 Instruksi Tugas

3.1 Persiapan

- Menginstall Python 3.8 atau lebih baru di sistem Anda
- Memilih salah satu tool manajemen environment: **conda**, **venv**, atau **uv**
- Membuka terminal/command prompt
- Menyiapkan dokumen $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ ini untuk dokumentasi

3.2 Bagian 1: Membuat Environment Python

3.2.1 Menggunakan uv (Modern dan cepat)

```

1 # Install uv terlebih dahulu jika belum ada
2 # pip install uv
3
4 # Membuat environment baru
5 uv venv multimedia-uv
6
7 # Mengaktifkan environment (Linux/Mac)
8 source multimedia-uv/bin/activate
9
10 # Mengaktifkan environment (Windows)
11 # multimedia-uv\Scripts\activate
12
13 # Verifikasi environment aktif
14 which python

```

Kode 1: Membuat environment dengan uv

Dokumentasi:

- Tool manajemen environment yang Anda pilih: **[uv]**
- Screenshot atau copy-paste output dari perintah verifikasi environment
- Gambar hasil verifikasi environment:

```

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.6216]
(c) Microsoft Corporation. All rights reserved.

E:\ltera\Multimedia\Code\Code1>pip install uv
Collecting uv
  Downloading uv-0.8.13-py3-none-win_amd64.whl.metadata (12 kB)
  Downloading uv-0.8.13-py3-none-win_amd64.whl (20.6 MB)
    20.6/20.6 MB 4.6 MB/s eta 0:00:00
Installing collected packages: uv
Successfully installed uv-0.8.13

[notice] A new release of pip is available: 23.3.2 -> 25.2
[notice] To update, run: python.exe -m pip install --upgrade pip

E:\ltera\Multimedia\Code\Code1>uv venv multimedia-uv
Using CPython 3.11.0 interpreter at: C:\Users\Sasalele\AppData\Local\Programs\Python\Python311\python.exe
Creating virtual environment at: multimedia-uv
Activate with: multimedia-uv\Scripts\activate

E:\ltera\Multimedia\Code\Code1>multimedia-uv
'multimedia-uv' is not recognized as an internal or external command,
operable program or batch file.

E:\ltera\Multimedia\Code\Code1>multimedia-uv\Scripts\activate
(multimedia-uv) E:\ltera\Multimedia\Code\Code1>which python
'which' is not recognized as an internal or external command,
operable program or batch file.

(multimedia-uv) E:\ltera\Multimedia\Code\Code1>where python
E:\ltera\Multimedia\Code\Code1\multimedia-uv\Scripts\python.exe
C:\Users\Sasalele\AppData\Local\Programs\Python\Python311\python.exe
C:\Users\Sasalele\anaconda3\python.exe
C:\Users\Sasalele\AppData\Local\Programs\Python\Python310\python.exe
C:\Users\Sasalele\AppData\Local\Microsoft\WindowsApps\python.exe

(multimedia-uv) E:\ltera\Multimedia\Code\Code1>

```

Gambar 1: Output Instalasi dan Verifikasi Environment

3.3 Bagian 2: Instalasi Library Multimedia

Setelah environment aktif, install library-library berikut:

3.3.1 Library Audio Processing

```
1 # Untuk conda:
2 conda install -c conda-forge librosa soundfile scipy
3
4 # Untuk pip (venv/uv):
5 pip install librosa soundfile scipy
```

Kode 2: Instalasi library audio

3.3.2 Library Image Processing

```
1 # Untuk conda:
2 conda install -c conda-forge opencv pillow scikit-image matplotlib
3
4 # Untuk pip (venv/uv):
5 pip install opencv-python pillow scikit-image matplotlib
```

Kode 3: Instalasi library image

3.3.3 Library Video Processing

```
1 # Untuk conda:
2 conda install -c conda-forge ffmpeg
3 pip install moviepy
4
5 # Untuk pip (venv/uv):
6 pip install moviepy
```

Kode 4: Instalasi library video

3.3.4 Library General Purpose

```
1 # Untuk conda:
2 conda install numpy pandas jupyter
3
4 # Untuk pip (venv/uv):
5 pip install numpy pandas jupyter
```

Kode 5: Instalasi library umum

Dokumentasikan di sini:

- Perintah instalasi yang Anda gunakan
 - Lib Audio Processing : uv pip install librosa soundfile scipy
 - Lib Image Processing : uv pip install opencv-python pillow scikit-image matplotlib
 - Lib Video Processing : uv pip install moviepy
 - Lib General Purpose : uv pip install numpy pandas jupyter
- Screenshot proses instalasi atau output sukses

```
(multimedia-uv) C:\itara\multimedia\Code\Code1>pip install librosa soundfile scipy
Collecting librosa
  Downloading librosa-0.11.0-py3-none-any.whl.metadata (8.7 kB)
Collecting soundfile
  Downloading soundfile-0.13.1-py2.py3-none-win_amd64.whl.metadata (16 kB)
Collecting scipy
  Downloading scipy-1.16.1-cp313-cp313-win_amd64.whl.metadata (60 kB)
Collecting audioread>=2.1.9 (from librosa)
  Downloading audioread-3.0.1-py3-none-any.whl.metadata (8.4 kB)
Collecting numba>=0.51.0 (from librosa)
  Downloading numba-0.61.2-cp313-cp313-win_amd64.whl.metadata (2.8 kB)
Collecting numpy>=1.22.3 (from librosa)
  Downloading numpy-2.3.2-cp313-cp313-win_amd64.whl.metadata (60 kB)
Collecting scikit-learn>=1.1.0 (from librosa)
  Downloading scikit_learn-1.7.1-cp313-cp313-win_amd64.whl.metadata (11 kB)
Collecting joblib>=1.0 (from librosa)
  Downloading joblib-1.5.2-py3-none-any.whl.metadata (5.6 kB)
Collecting decorator>=4.3.0 (from librosa)
  Downloading decorator-5.2.1-py3-none-any.whl.metadata (3.9 kB)
Collecting pooch>=1.1 (from librosa)
  Downloading pooch-1.8.2-py3-none-any.whl.metadata (10 kB)
Collecting soxr>=0.3.2 (from librosa)
  Downloading soxr-0.5.0.post1-cp312-abi3-win_amd64.whl.metadata (5.6 kB)
Collecting typing_extensions>=4.1.1 (from librosa)
```

Gambar 2: Proses Instalasi Library Audio

```
(multimedia-uv) C:\itara\multimedia\Code\Code1>pip install opencv-python pillow scikit-image matplotlib
Collecting opencv-python
  Downloading opencv_python-4.12.0.88-cp37-abi3-win_amd64.whl.metadata (19 kB)
Collecting pillow
  Downloading pillow-11.3.0-cp313-cp313-win_amd64.whl.metadata (9.2 kB)
Collecting scikit-image
  Downloading scikit_image-0.25.2-cp313-cp313-win_amd64.whl.metadata (14 kB)
Collecting matplotlib
  Downloading matplotlib-3.10.5-cp313-cp313-win_amd64.whl.metadata (11 kB)
Requirement already satisfied: numpy<2.3.0, >=2 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from opencv-python) (2.2.6)
Requirement already satisfied: scipy>=1.11.4 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from opencv-python) (1.16.1)
Collecting networkx>=3.0 (from scikit-image)
  Downloading networkx-3.5-py3-none-any.whl.metadata (6.3 kB)
Collecting imageio<2.35.0, >=2.33 (from scikit-image)
  Downloading imageio-2.37.0-py3-none-any.whl.metadata (5.2 kB)
Collecting tifffile>=2022.8.12 (from scikit-image)
  Downloading tifffile-2025.8.12-py3-none-any.whl.metadata (32 kB)
Requirement already satisfied: packaging>=21 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from scikit-image) (25.0)
Requirement already satisfied: lazy-loader>=0.4 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from scikit-image) (0.4)
Collecting contourpy>=1.0.1 (from matplotlib)
  Downloading contourpy-1.3.3-cp313-cp313-win_amd64.whl.metadata (5.5 kB)
```

Gambar 3: Proses Instalasi Library Image

```
(multimedia-uv) C:\itara\multimedia\Code\Code1>pip install moviepy
Collecting moviepy
  Downloading moviepy-2.2.1-py3-none-any.whl.metadata (6.9 kB)
Requirement already satisfied: decorator<6.0, >=4.0.2 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from moviepy) (5.2.1)
Requirement already satisfied: imageio<3.0, >=2.5 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from moviepy) (2.37.0)
Collecting imageio_ffmpeg>=0.2.0 (from moviepy)
  Downloading imageio_ffmpeg-0.6.0-py3-none-win_amd64.whl.metadata (1.5 kB)
Requirement already satisfied: numpy>=1.25.0 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from moviepy) (2.2.6)
Collecting proglog<1.0.0 (from moviepy)
  Downloading proglog-0.1.12-py3-none-any.whl.metadata (794 bytes)
Collecting python-dotenv>=0.10 (from moviepy)
  Downloading python_dotenv-1.1.1-py3-none-any.whl.metadata (24 kB)
Requirement already satisfied: pillow<12.0, >=9.2.0 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from imageio_ffmpeg) (11.3.0)
```

Gambar 4: Proses Instalasi Library Video

```
(multimedia-uv) C:\itara\multimedia\Code\Code1>pip install numpy pandas jupyter
Requirement already satisfied: numpy in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (2.2.6)
Collecting pandas
  Downloading pandas-2.3.2-cp313-cp313-win_amd64.whl.metadata (19 kB)
Collecting jupyter
  Downloading jupyter-1.1.1-py2.py3-none-any.whl.metadata (2.0 kB)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\aloisius edwin\appdata\local\programs\python\python313\lib\site-packages (from pandas) (2.9.0.post0)
Collecting pytz>=2020.1 (from pandas)
  Downloading pytz-2025.2-py2.py3-none-any.whl.metadata (22 kB)
Collecting tzdata>=2022.7 (from pandas)
  Downloading tzdata-2025.2-py2.py3-none-any.whl.metadata (1.4 kB)
Collecting notebook (from jupyter)
  Downloading notebook-7.4.5-py3-none-any.whl.metadata (10 kB)
Collecting jupyter-console (from jupyter)
  Downloading jupyter_console-6.6.3-py3-none-any.whl.metadata (5.8 kB)
Collecting nbconvert (from jupyter)
  Downloading nbconvert-7.16.6-py3-none-any.whl.metadata (8.5 kB)
```

Gambar 5: Proses Instalasi Library General Purpose

- Daftar library yang berhasil diinstall dengan versinya:

anyio==4.10.0	babel==2.17.0
argon2-cffi==25.1.0	beautifulsoup4==4.13.5
argon2-cffi-bindings==25.1.0	bleach==6.2.0
arrow==1.3.0	certifi==2025.8.3
asttokens==3.0.0	cffi==1.17.1
async-lru==2.0.5	charset-normalizer==3.4.3
attrs==25.3.0	colorama==0.4.6
audioop-lts==0.2.2	comm==0.2.3
audioread==3.0.1	contourpy==1.3.3

```
cycler==0.12.1
debugpy==1.8.16
decorator==5.2.1
defusedxml==0.7.1
executing==2.2.0
fastjsonschema==2.21.2
fonttools==4.59.2
fqdn==1.5.1
h11==0.16.0
httpcore==1.0.9
httpx==0.28.1
idna==3.10
imageio==2.37.0
imageio-ffmpeg==0.6.0
ipykernel==6.30.1
ipython==9.4.0
ipython_pygments_lexers==1.1.1
ipywidgets==8.1.7
isoduration==20.11.0
jedi==0.19.2
Jinja2==3.1.6
joblib==1.5.2
json5==0.12.1
jsonpointer==3.0.0
jsonschema==4.25.1
jsonschema-specifications==2025.4.1
jupyter==1.1.1
jupyter-console==6.6.3
jupyter-events==0.12.0
jupyter-lsp==2.3.0
jupyter_client==8.6.3
jupyter_core==5.8.1
jupyter_server==2.17.0
jupyter_server_terminals==0.5.3
jupyterlab==4.4.6
jupyterlab_pygments==0.3.0
jupyterlab_server==2.27.3
jupyterlab_widgets==3.0.15
kiwisolver==1.4.9
lark==1.2.2
lazy_loader==0.4
librosa==0.11.0
llvmlite==0.44.0
MarkupSafe==3.0.2
matplotlib==3.10.5
matplotlib-inline==0.1.7
mistune==3.1.3
moviepy==2.2.1
msgpack==1.1.1
nbclient==0.10.2
nbconvert==7.16.6
nbformat==5.10.4
nest-asyncio==1.6.0
networkx==3.5
notebook==7.4.5
notebook_shim==0.2.4
numba==0.61.2
numpy==2.2.6
opencv-python==4.12.0.88
packaging==25.0
pandas==2.3.2
pandocfilters==1.5.1
parso==0.8.5
pillow==11.3.0
platformdirs==4.4.0
pooch==1.8.2
proglog==0.1.12
prometheus_client==0.22.1
prompt_toolkit==3.0.52
psutil==7.0.0
pure_eval==0.2.3
pycparser==2.22
Pygments==2.19.2
pyparsing==3.2.3
python-dateutil==2.9.0.post0
python-dotenv==1.1.1
python-json-logger==3.3.0
pytz==2025.2
pywin32==311
pywinpty==3.0.0
PyYAML==6.0.2
pyzmq==27.0.2
referencing==0.36.2
requests==2.32.5
rfc3339-validator==0.1.4
rfc3986-validator==0.1.1
rfc3987-syntax==1.1.0
rpds-py==0.27.1
scikit-image==0.25.2
scikit-learn==1.7.1
scipy==1.16.1
Send2Trash==1.8.3
setuptools==80.9.0
six==1.17.0
sniffio==1.3.1
soundfile==0.13.1
soupsieve==2.8
soxr==0.5.0.post1
stack-data==0.6.3
standard-aifc==3.13.0
```

```

standard-chunk==3.13.0
standard-sunau==3.13.0
terminado==0.18.1
threadpoolctl==3.6.0
tiffiffle==2025.8.28
tinycss2==1.4.0
tornado==6.5.2
tqdm==4.67.1
traitlets==5.14.3
types-python-dateutil==2.9.0.20250822
typing_extensions==4.15.0
tzdata==2025.2
uri-template==1.3.0
urllib3==2.5.0
uv==0.8.13
wcwidth==0.2.13
webcolors==24.11.1
webencodings==0.5.1
websocket-client==1.8.0
widgetsnbextension==4.0.14

```

3.4 Bagian 3: Verifikasi Instalasi

Buat file Python sederhana untuk menguji semua library yang telah diinstall:

```

1 import importlib
2
3 def test_libraries(requirements_file="requirements.txt"):
4     with open(requirements_file, "r") as f:
5         lines = f.readlines()
6
7     # ambil nama library tanpa versi
8     libs = [line.strip().split("==")[0] for line in lines if line.strip() and not line.startswith("#")]
9
10    for lib in libs:
11        try:
12            importlib.import_module(lib)
13            print(f"[OK] {lib} berhasil diimport")
14        except Exception as e:
15            print(f"[FAIL] {lib} gagal diimport -> {e}")
16
17 if __name__ == "__main__":
18     test_libraries("requirements.txt")

```

Kode 6: Uji library multimedia

Jalankan script dan dokumentasikan hasilnya:

3.5 Bagian 4: Simple Test dengan Sample Code

Buat dan jalankan contoh sederhana untuk setiap kategori multimedia:

3.5.1 Test Audio Processing

```

1 import numpy as np
2 import matplotlib.pyplot as plt
3
4 # Generate simple sine wave
5 duration = 2 # seconds
6 sample_rate = 44100
7 frequency = 440 # A4 note
8
9 t = np.linspace(0, duration, int(sample_rate * duration))
10 audio_signal = np.sin(2 * np.pi * frequency * t)
11
12 # Plot waveform
13 plt.figure(figsize=(10, 4))

```

```

14 plt.plot(t[:1000], audio_signal[:1000]) # Plot first 1000 samples
15 plt.title('Sine Wave (440 Hz)')
16 plt.xlabel('Time (s)')
17 plt.ylabel('Amplitude')
18 plt.grid(True)
19 plt.savefig('sine_wave_test.png', dpi=150, bbox_inches='tight')
20 plt.show()
21
22 print(f"Generated {duration}s sine wave at {frequency}Hz")
23 print(f"Sample rate: {sample_rate}Hz")
24 print(f"Total samples: {len(audio_signal)}")

```

Kode 7: Test audio processing sederhana

3.5.2 Test Image Processing

```

1 import numpy as np
2 import matplotlib.pyplot as plt
3 from PIL import Image
4
5 # Create a simple test image
6 width, height = 400, 300
7 image = np.zeros((height, width, 3), dtype=np.uint8)
8
9 # Add some patterns
10 image[:, :width//3, 0] = 255 # Red section
11 image[:, width//3:2*width//3, 1] = 255 # Green section
12 image[:, 2*width//3:, 2] = 255 # Blue section
13
14 # Add a white circle in the center
15 center_x, center_y = width//2, height//2
16 radius = 50
17 Y, X = np.ogrid[:height, :width]
18 mask = (X - center_x)**2 + (Y - center_y)**2 <= radius**2
19 image[mask] = [255, 255, 255]
20
21 # Display and save
22 plt.figure(figsize=(8, 6))
23 plt.imshow(image)
24 plt.title('Test Image with RGB Stripes and White Circle')
25 plt.axis('off')
26 plt.savefig('test_image.png', dpi=150, bbox_inches='tight')
27 plt.show()
28
29 print(f"Created test image: {width}x{height} pixels")
30 print(f"Image shape: {image.shape}")
31 print(f"Image dtype: {image.dtype}")

```

Kode 8: Test image processing sederhana

Dokumentasikan hasil eksekusi:

- Screenshot output dari kedua script di atas
- Gambar yang dihasilkan (sine_wave_test.png dan test_image.png)
- Error message jika ada dan cara mengatasinya

4 Bagian Laporan

4.1 Output Verifikasi Instalasi

Copy-paste output lengkap dari script **test_multimedia.py** di sini:

1 [PASTE OUTPUT DI SINI]

Kode 9: Output verifikasi instalasi

4.2 Screenshot Hasil Test

Sisipkan screenshot atau gambar hasil dari:

- Terminal/command prompt yang menunjukkan environment aktif
- Output dari script test audio (sine wave plot)
- Output dari script test image (RGB stripes dengan circle)

Gunakan perintah `\includegraphics` untuk menyisipkan gambar

4.3 Analisis dan Refleksi

Jawab pertanyaan berikut:

1. Mengapa penting menggunakan environment terpisah untuk project multimedia?
[Jawaban Anda di sini]
2. Apa perbedaan utama antara conda, venv, dan uv? Mengapa Anda memilih tool yang Anda gunakan?
[Jawaban Anda di sini]
3. Library mana yang paling sulit diinstall dan mengapa?
[Jawaban Anda di sini]
4. Bagaimana cara mengatasi masalah dependency conflict jika terjadi?
[Jawaban Anda di sini]
5. Jelaskan fungsi dari masing-masing library yang berhasil Anda install!
[Jawaban Anda di sini]

4.4 Troubleshooting

Dokumentasikan masalah yang Anda hadapi (jika ada) dan cara mengatasinya:

- **Masalah 1:** *[Deskripsi masalah]*
Solusi: *[Cara mengatasi]*
- **Masalah 2:** *[Deskripsi masalah]*
Solusi: *[Cara mengatasi]*

5 Export Environment untuk Reproduksi

Sebagai langkah terakhir, export environment Anda agar dapat direproduksi:

5.1 Untuk Conda

```
1 conda env export > environment.yml
```

Kode 10: Export conda environment

5.2 Untuk venv/uv

```
1 pip freeze > requirements.txt
```

Kode 11: Export pip requirements

Copy-paste isi file environment.yml atau requirements.txt di sini:

```
1 [PASTE ISI FILE DI SINI]
```

Kode 12: Environment/Requirements file

6 Kesimpulan

Tuliskan kesimpulan Anda mengenai:

- Pengalaman setup Python environment untuk multimedia
- Persiapan untuk project multimedia selanjutnya
- Saran untuk mahasiswa lain yang akan melakukan setup serupa

[Kesimpulan Anda di sini]

7 Referensi

Sertakan referensi yang Anda gunakan selama proses setup dan troubleshooting.

References