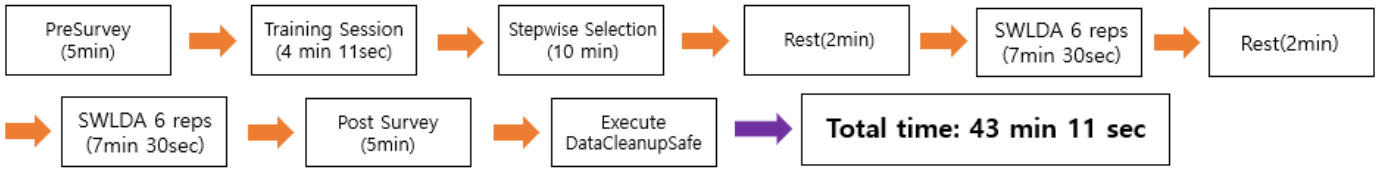
##

This manual has been written to help researchers conduct an experiment more efficiently. Therefore, a template for experiment progress was proposed, and guidelines were presented for step-by-step experimentation. The survey is currently written in Korean. Think of it as template and modify it and use it.

We inform you that we do not take any responsibility for the consequences. However, we inform you that we used this system well and writing a paper now.

##

Procedure of the experiment



Stepwise Selection: Stepwise function execution time. Time may vary depending on computer performance.

1. Pre Survey: Survey conducted prior to the experiment

- Execute (WorldSystem₩Survey_Program₩Build₩Survey_Program.exe)

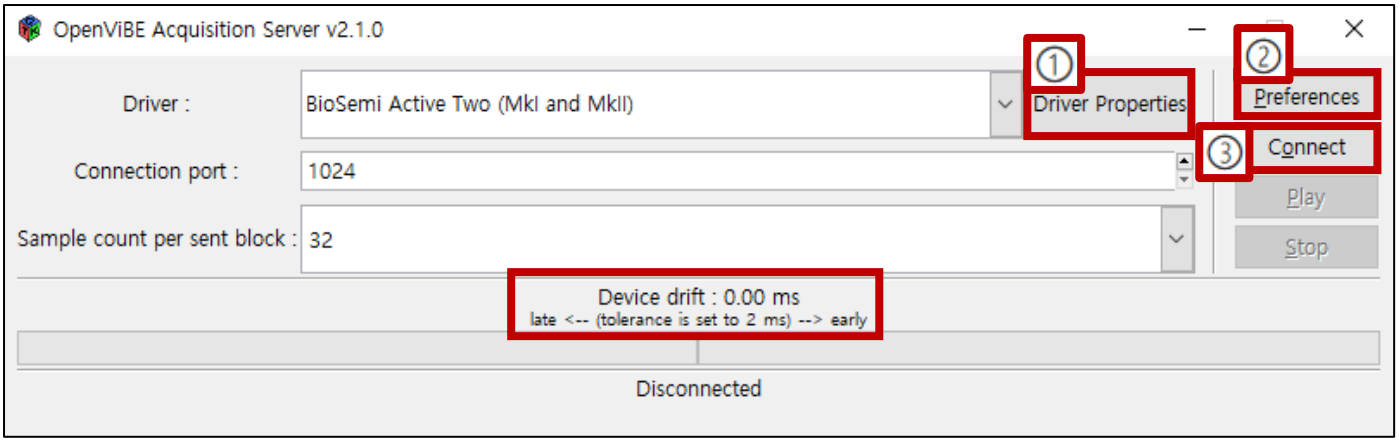
- **As an attention issue, it is recommended to ask the subject to count each time the target button blinks.**

2. Experiment equipment setting (BioSemi ActiveTwo)

*** If other equipment is used, the channel related parts in the internal code and the parameters of the Channel Selector box of the Openvibe designer must be modified.**

EEG measurement status check → Biosemi Active viewer

① Execute Openvibe Acquisition Server



1 Enter the Driver Properties banner and click the Change channel names button. Add a channel by loading the 32_channel.txt file existing in the WorldSystem folder

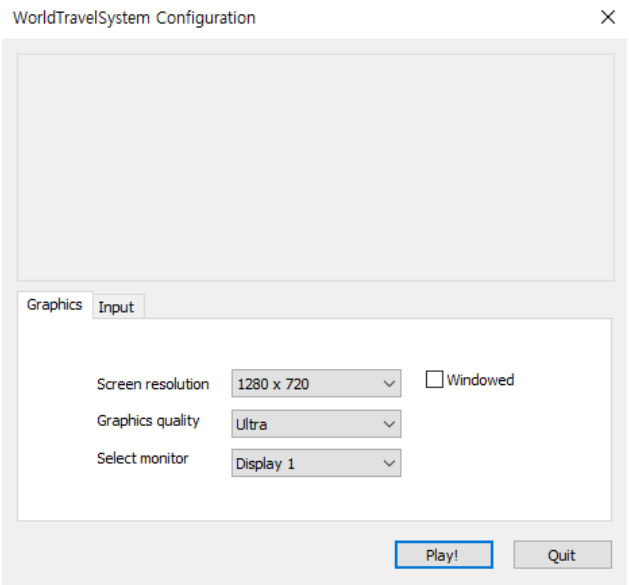
2 Enter the Preferences banner and check whether TCP_Tagging_Port is 12140 or not. If not, set this value.

3 Click Connect and then Play button to start measurement on Openvibe. As this time, it the Device drift bar drift vibrates to the right and left, go to Preferences and set Drift Correction to "Let the driver decide". Otherwise, set Disable to default.

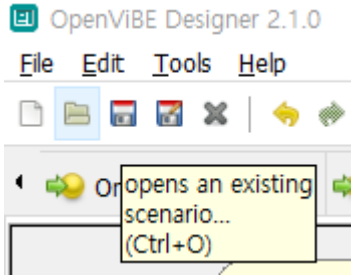
② Execute Openvibe Designer

3. Training Session

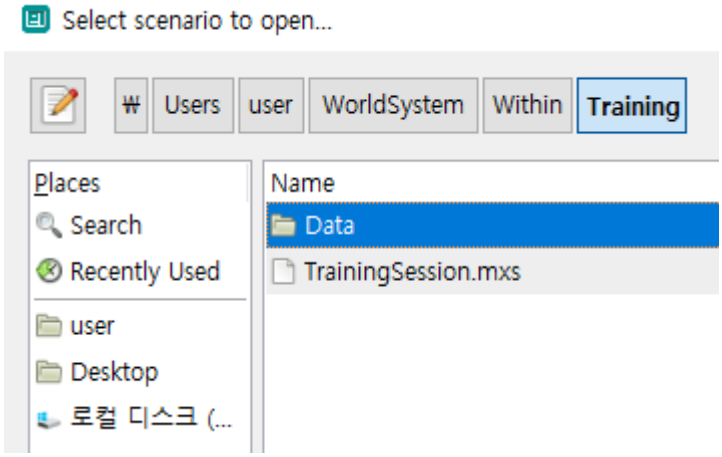
① Execute Unity application: WorldSystem₩WorldDemo₩World_125₩WorldTravelSystem.exe



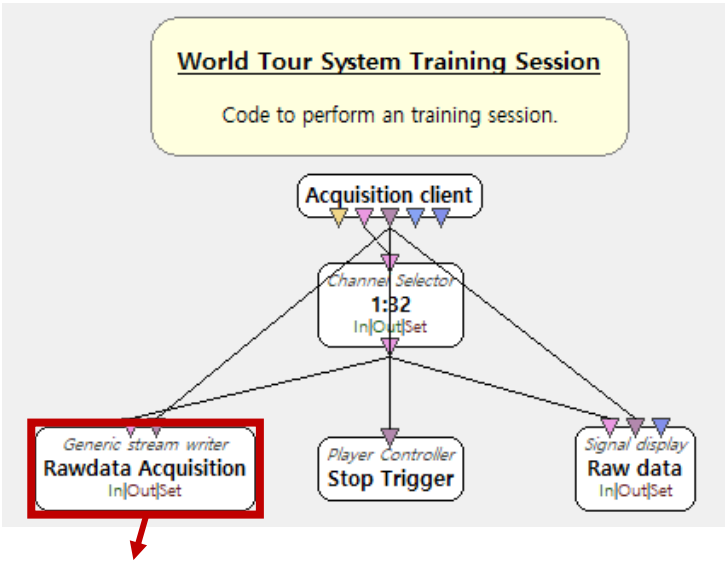
② Open a OpenViBE Designer and load senario: WorldSystem₩Within₩Training₩TrainingSession.mxs

A. 

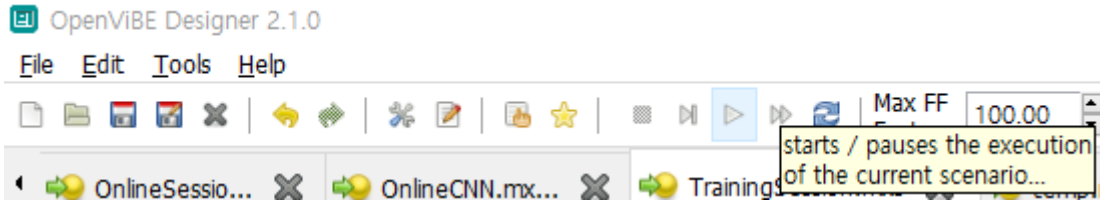
Execute Openvibe Designer and open an existing scenario.

B. 

Load mxs file in that path.



* The location where the ov file is saved must be set correctly.

C. 

Press that button and execute designer code.

D. On the Unity application, the user enters the ID, press the Training button in the menu, and start measuring.

E. **When the measurement is complete, execute Spyder or another Python IDLE.**
Load and execute WorldSystem₩Within₩SourceCode₩StepwiseSelection.py

```
def main():
        start = time.time()

        ##Generate Preprocessing Training data
        ctime = datetime.today().strftime("%m%d_%H%M")
        SelectedF_path = 'D:/WorldSystem/Within/StepWise/Features/' + ctime + 'SelectedFeatures.pickle'
        Classifier_path = 'D:/WorldSystem/Within/StepWise/Classifiers/' + ctime + 'Classifier.pickle'

        channelNum = 32
        downsampleRate = 4

        ov_Path = "C:/Users/wldk5/WorldSystem/Within/Training/Data/"
```

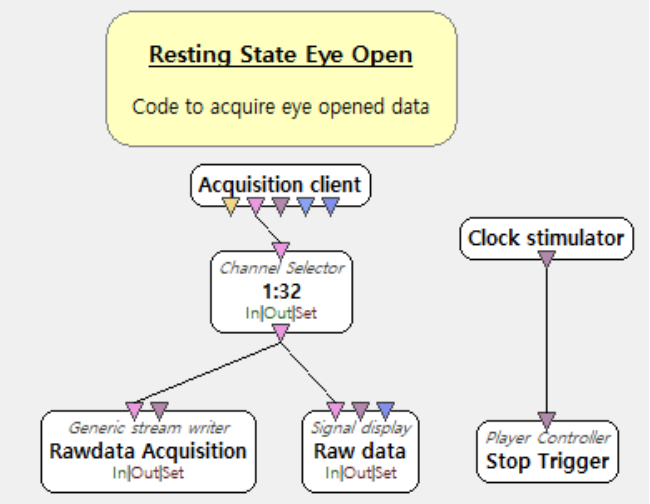
* Please specify your file locations.

Make sure it is working and then continue the next experiment. 😊

If you encounter problems running your code, it is most likely related to the matlab.engine library. See WTS_Documentation for details (**Call Matlab function in Python section** of **Within Session used SWLDA**.)

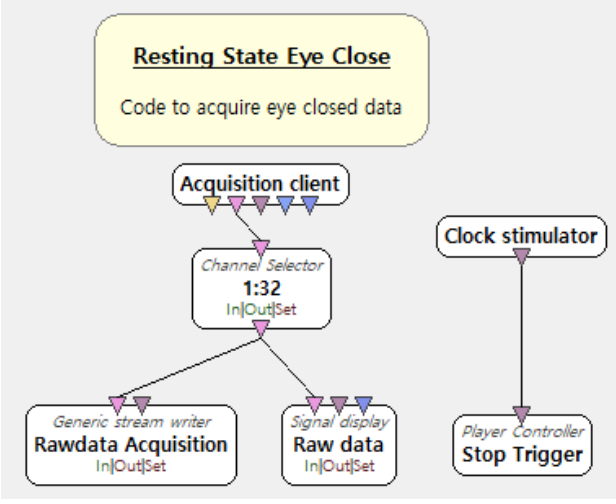
4. Rest

Eye Open: Openvibe Designer → Load WorldSystem₩RestingState₩RestingEyeOpen.mxs



Measure the eye open data for 1 minute

Eye Close: Openvibe Designer → Load WorldSystem₩RestingState₩RestingEyeClose.mxs



Measure the eye closed data for 1 minute

5. SWLDA Online Session

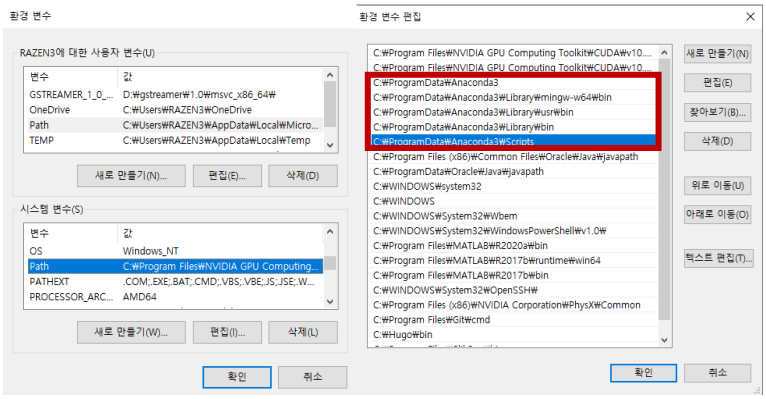
Verify that the StepwiseSelection code you ran earlier was terminated and the following results were obtained:

```
resulting features:
[  46   57  139  232  553  809  812  828 1037 1046 1075 1113 1127 1186
 1188 1200 1304 1342 1495 1508 1804 1970]
time : 750.8348515033722
```

Two version is available. You can use either one of them.

Ver1.

Now that openvibe (3.0 or higher) supports python3, you can use python scripting box more simply. However, there is still an environment variable conflict problem. If a variable for a virtual environment such as anaconda is set in the environment variable, openvibe designer may not run or you may not be able to use the python scripting box.



The picture on the left shows the environment variable editing window. If the python path is set in an indirect way as follows, openvibe designer fails to run python. This problem is solved by setting the environment variable as shown in the figure below. For this, you need to install a basic python module, not anaconda, and install and use the libraries to be used for this module.

If you get an error on Designer startup that Python installation is corrupt, or that "can't find module site",try opening Control Panel, System, Advanced System Settings, Environment Variables, and there set two global environment variables:make sure that the following python paths are in your Path environment variable:

```
PYTHONHOME = C:₩Python27
PYTHONPATH = C:₩Python27₩Lib
```

The use of Ver1 is detailed in the Online Session section of WTS_Documentation page7-9.

Ver2.

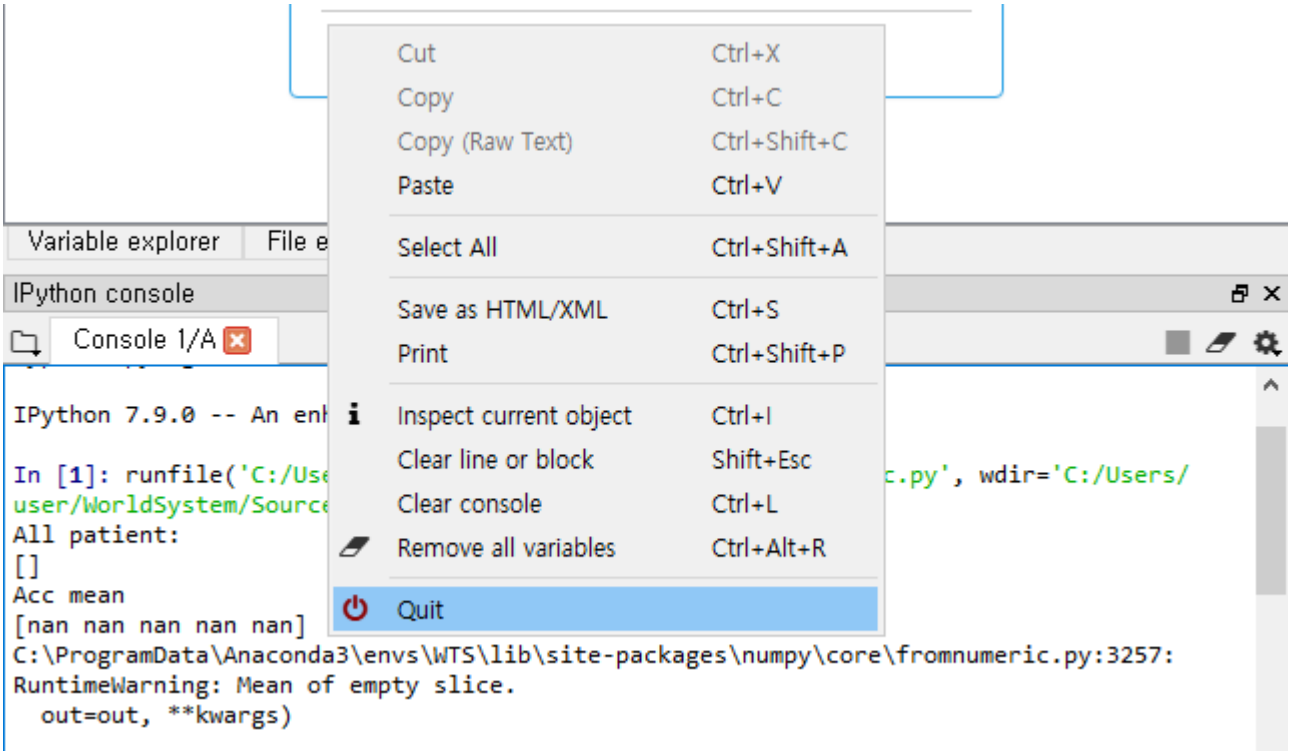
In the case of Ver2, the python module is operated independently. In other words, after accumulating data in Openvibe designer, pre-processing and classification are performed in the python module that operates separately.

Please check and procees with SWLDA Online session!
Then, execute Spyder or another Python IDLE,
Execute WorldSystem₩Within₩SourceCode₩SWLDA_Main.py

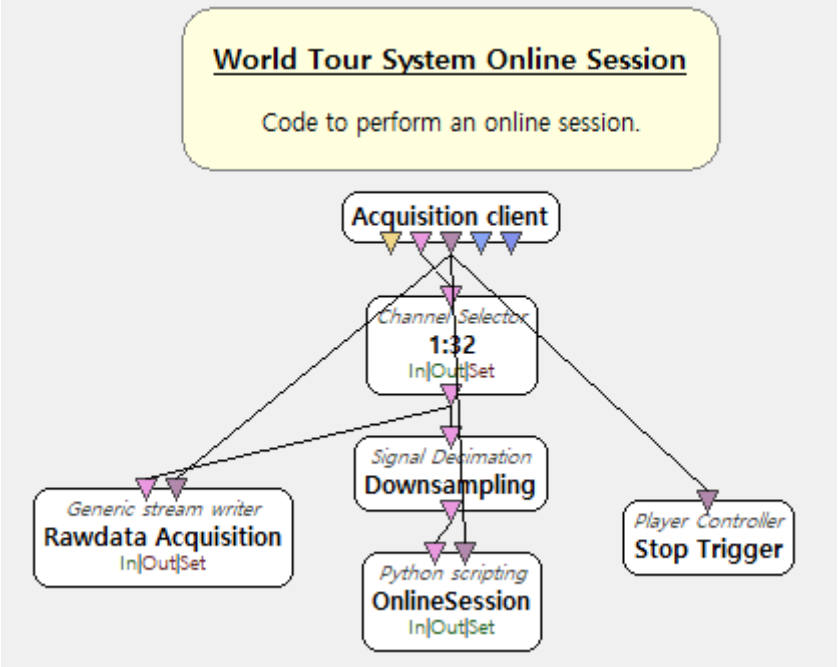
```
def main():
#        global file_exist, file1, file2, channelNum
        eegData_txt = 'WorldSystem/Within/Onlinetemp/eegData.out'
        stims_txt = 'WorldSystem/Within/Onlinetemp/stims.out'
        start_txt = 'WorldSystem/Within/Onlinetemp/start.out'
        moveData_eeg = 'WorldSystem/Within/Online/Data/txt_files/eegData/'
        moveData_stims = 'WorldSystem/Within/Online/Data/txt_files/stims/'

        channelNum = 32
        downsampleRate = 4

        serverSock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
        serverSock.bind(('', 12240))
        serverSock.listen(0)
        connectionSock, addr = serverSock.accept()
        print('The connection has been confirmed at',str(addr))
```

The message "The connection has been confirmed at~" indicates that TCP communication is ready. If not, restart the code.

If you want to force an end,



Openvibe Designer → Load WorldSystem₩Within₩Online₩OnlineSession.mxs



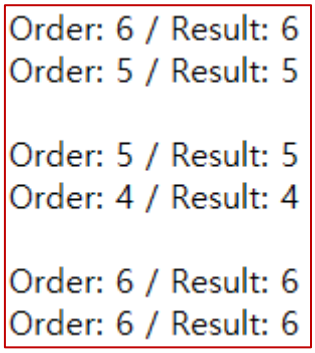
Run with the designer code **"infinite loop button" pressed**, then press the Play button in the Unity application menu and start measuring. It will automatically shut down after selecting city 6 times (Python module will also shut down), but you must turn off the openvibe manually!

* If you want to perform more trials, you must modify the SWLDA_Main.py (for statement) and the continent's code of Unity script.

If you want to check the results,

WorldSystem₩WorldDemo₩World_125₩WorldTravelSystem_Data₩StreamingAssets

Here the txt tile produces the following results: Order is the instruction about current session, Result is the result of the prediction.



6. Rest: Same as 4. Rest. Repeat it!

7. SWLDA Online Session: Same as 5. SWLDA Online Session. Repeat it!

8. Post Survey: Survey conducted after experiment

- WorldSystem₩Post_Survey₩Build₩Post_Survey 실행

9. Data clean up

Execute Spyder or another Python IDLE,

Execute WorldSystem₩SourceCode₩DataCleanupSafe.py

```
def main():
        start_txt = 'C:/Users/wldk5/WorldSystem/Zero/CNNtemp/start.out'
        if os.path.isfile(start_txt):
            os.remove(start_txt)

        ##Generate User folder
        RootPath = "C:/Users/wldk5/WorldSystem/UserData/"
        RestingState_Path = "C:/Users/wldk5/WorldSystem/RestingState/"
        TrainingData_Path = "C:/Users/wldk5/WorldSystem/Within/Training/Data/"
        OnlineResult_Path = "C:/Users/wldk5/WorldSystem/WorldDemo/World_125/WorldTravelSyst
        OnlineData_Path = "C:/Users/wldk5/WorldSystem/Within/Online/Data/"
        OnlineTxt_Path = "C:/Users/wldk5/WorldSystem/Within/Online/Data/txt_files/"
        Stepwise_Path = "C:/Users/wldk5/WorldSystem/Within/StepWise/"
        ZeroData_Path = "C:/Users/wldk5/WorldSystem/Zero/Online/Data/"
        ZeroTxt_Path = "C:/Users/wldk5/WorldSystem/Zero/Online/Data/txt_files/"
        DataAcquisition_Path = "C:/Users/wldk5/WorldSystem/DataAcquisition/Data/"
        PreSurvey_Path = "C:/Users/wldk5/WorldSystem/Survey_Program/Build/Survey_Program_Da
        PostSurvey_Path = "C:/Users/wldk5/WorldSystem/Post_Survey/Build/Post_Survey_Data/St
        Result_list = []
            #They are stored in the list in the order they are stored.
        Result_list = sorted(glob.glob(OnlineResult_Path + '*.txt'), key=os.path.getmtime)
            #Create a folder with the name of the first file created
        UserName = Result_list[0][86:-4]
        CurrentFolder = RootPath + UserName
```

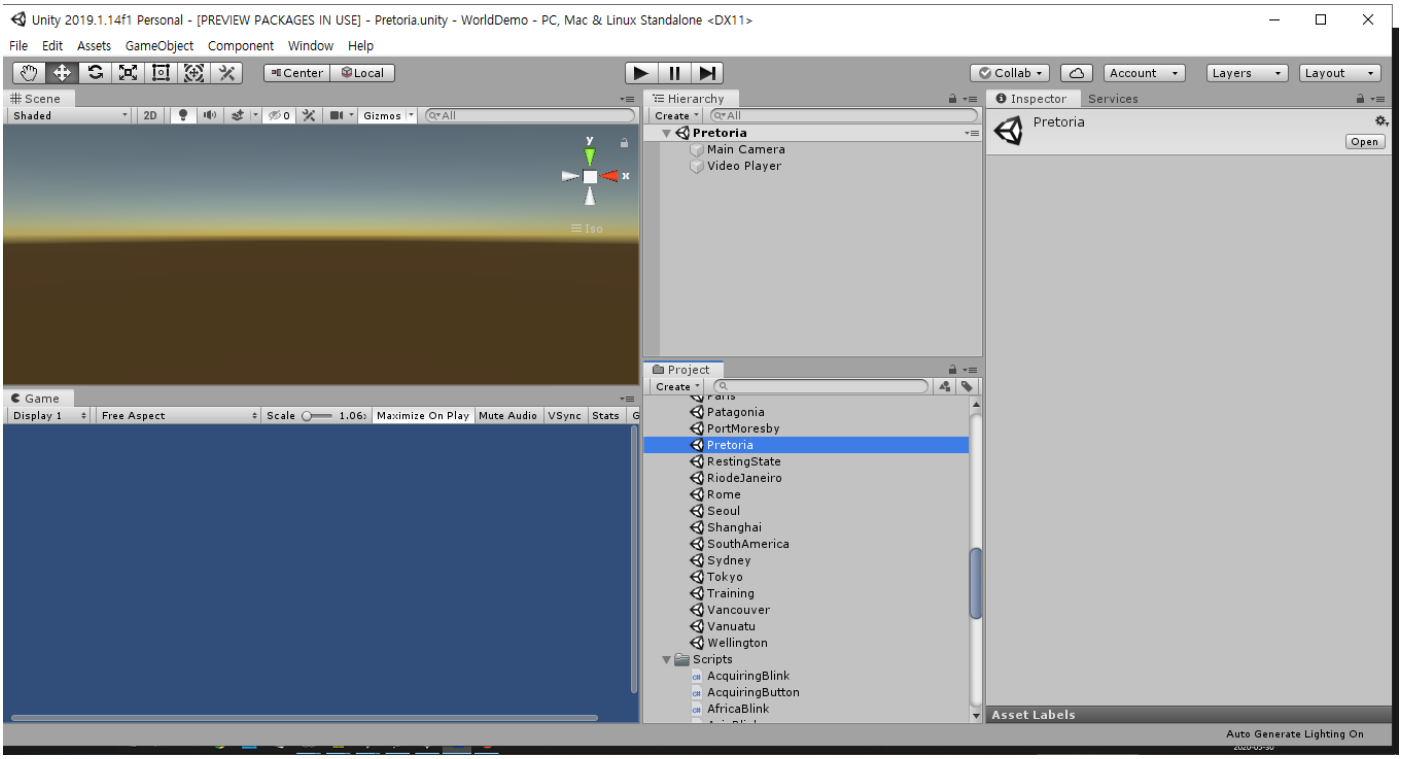
This is a code that organizes the subject's data into a single folder within the UserData folder.

```
for t in range(0, x):
    shutil.move(Resting_list[t], CurrentFolder + '/RestingData/' + Resting_list[t][40:])
```

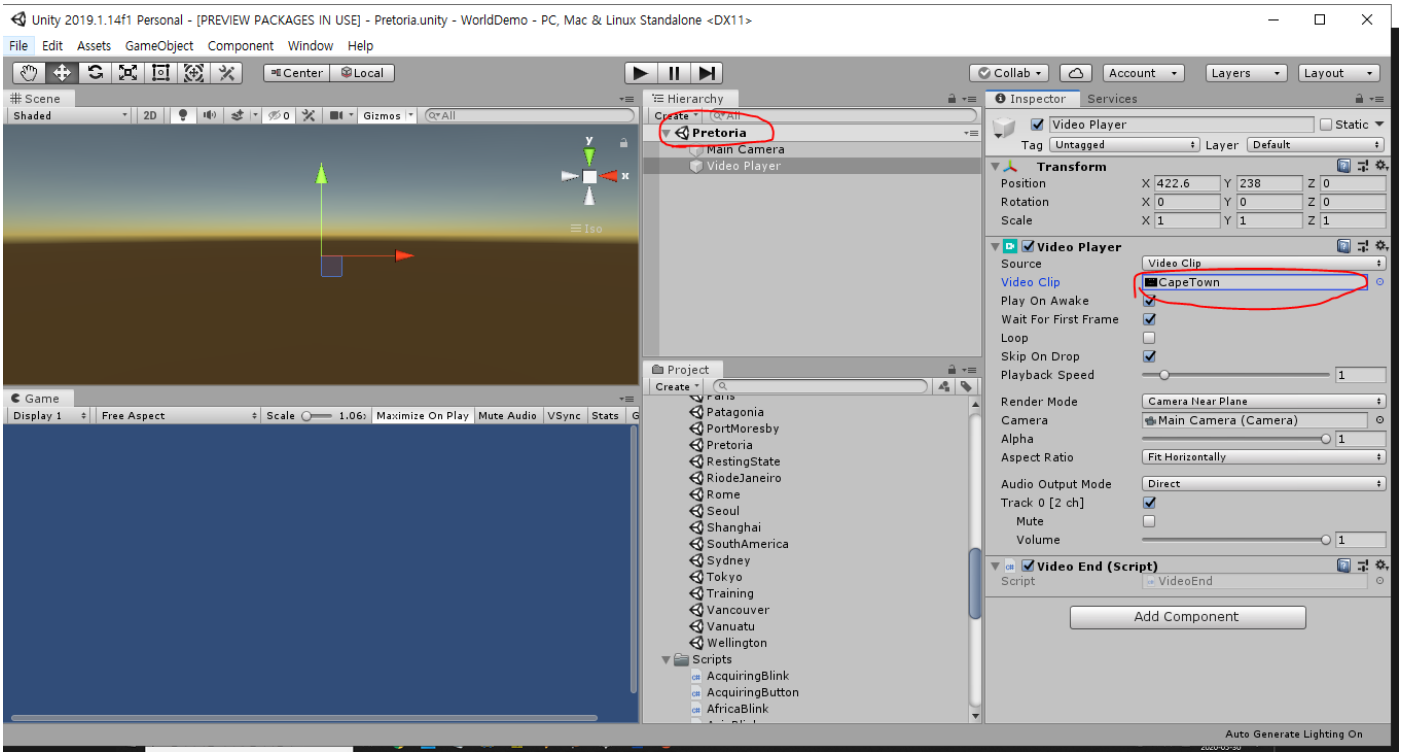
Warning: Adjust the array slicing position to make sure your data is stored in the desired folder!! Problems arising from mistakes are not warranted.

Modify video clip

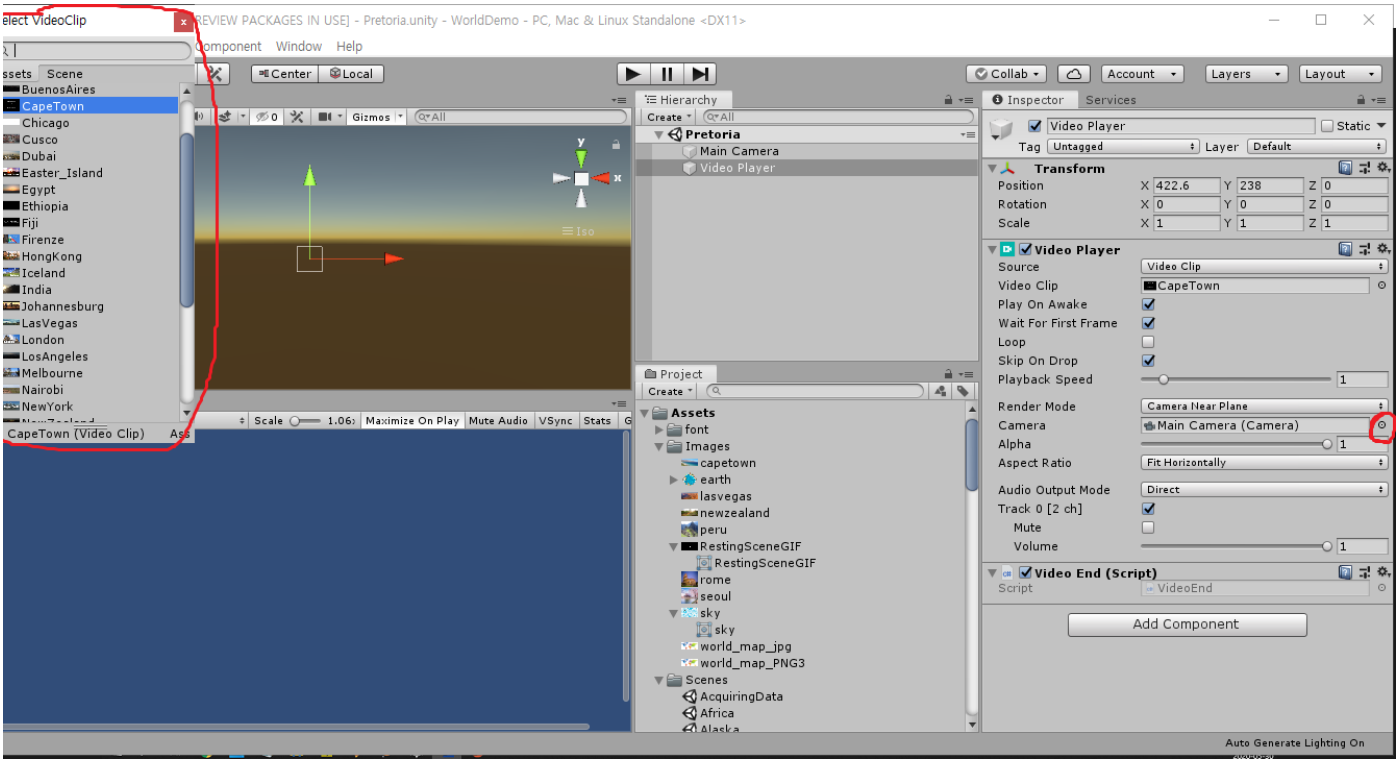
1. In the Unity window's Project banner, go to the asset you want to modify.



2. When you go video player inspector, video clip is empty or selected as another city.



3. If you click the button with a dot on the right of the video clip, the videoclip selection window appears. Here, double-click the video for the relevant video.


elect VideoClip
REVIEW PACKAGES IN USE] - Pretoria.unity - WorldDemo - PC, Mac & Linux Standalone <DX11>
Component Window Help
Center Local
Collab Account Layers Layout
Scene
BuenosAires
CapeTown
Chicago
Cusco
Dubai
Easter_Island
Egypt
Ethiopia
Fiji
Firenze
HongKong
Iceland
India
Johannesburg
LasVegas
London
LosAngeles
Melbourne
Nairobi
NewYork
Gizmos
Iso
Hierarchy
Create
Pretoria
Main Camera
Video Player
Inspector
Services
Video Player
Static
Tag Untagged
Layer Default
Transform
Position X 422.6 Y 238 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1
Video Player
Source Video Clip
Video Clip CapeTown
Play On Awake
Wait For First Frame
Loop
Skip On Drop
Playback Speed 1
Render Mode Camera Near Plane
Camera Main Camera (Camera)
Alpha 1
Aspect Ratio Fit Horizontally
Audio Output Mode Direct
Track 0 [2 ch]
Mute
Volume 1
Video End (Script)
Script VideoEnd
Add Component
Project
Create
Assets
font
Images
capetown
earth
lasvegas
newzealand
peru
RestingSceneGIF
RestingSceneGIF
rome
seoul
sky
sky
world_map_jpg
world_map_PNG3
Scenes
AcquiringData
Africa
Scale 1.06
Maximize On Play
Mute Audio
VSync
Stats
CapeTown (Video Clip)
Auto Generate Lighting On