# Running PSO + Neural Network Code Using Local Virtual Machine (VM) in Visual Studio Code

## Requirements

* - VirtualBox
* - Ubuntu ISO (20.04 or 22.04 preferred)
* - Visual Studio Code
* - VS Code Remote - SSH Extension
* - Python 3.8+ and pip
* - SQLite3
* - Git (optional)

## Step 1: Create the Virtual Machine

* 1. Open VirtualBox and click New.
* 2. Name the VM (e.g., ML-Env), set Type to Linux and Version to Ubuntu (64-bit).
* 3. Allocate at least 4 GB RAM (8 GB recommended) and 2 CPU cores.
* 4. Create a virtual hard disk with 20 GB or more.
* 5. Mount the Ubuntu ISO under Settings > Storage > Empty > Choose a disk file.

## Step 2: Install Ubuntu on VM

* 1. Start the VM and follow the Ubuntu installation prompts.
* 2. Choose minimal install and enable 3rd party drivers.
* 3. Create a user (e.g., mluser) and set a password.

## Step 3: Install Essential Software Inside the VM

* Run the following in Ubuntu terminal:
* sudo apt update && sudo apt upgrade -y
* sudo apt install python3 python3-pip python3-venv sqlite3 git -y
* Optional for Jupyter: pip install notebook

## Step 4: Set Up Python Environment

* 1. Create a folder: mkdir ~/pso\_nn\_project && cd ~/pso\_nn\_project
* 2. Create virtual environment: python3 -m venv venv
* 3. Activate it: source venv/bin/activate
* 4. Install libraries: pip install numpy pandas matplotlib seaborn scikit-learn tensorflow

## Step 5: Load the Dataset

* 1. Place the database.sqlite file inside ~/pso\_nn\_project/.
* 2. Update the code to connect using: sqlite3.connect('database.sqlite')

## Step 6: Open VS Code for Editing (Optional)

* 1. Install Remote-SSH extension in VS Code.
* 2. Get IP on VM via ip a, then configure SSH in VS Code:
* Host ubuntu-vm
* HostName 192.168.x.x
* User mluser
* IdentityFile path\_to\_ssh\_key (optional if using password login)

## Step 7: Run Your Code

* Activate virtualenv: source venv/bin/activate
* Run: python your\_pso\_script.py
* Ensure correct SQLite path and presence of all 3 parts in code.

## Performance Notes

* - VM may be slower than Google Colab or Kaggle.
* - Offers full control and offline use.
* - Host system specs affect speed.