# Presentation Outline



- **Topic name:** PyTorch Machine Learning Library for Python
- **Individual:** Dieu My Nguyen
- **Outline of full presentation content:**
  - Python: A (very) brief introduction
    - An interpreted, high-level, general-purpose programming language.
    - Created by Guido van Rossum, first release: 1991, current version: 3.7.2
    - Design philosophy emphasizes code readibility
    - Supports multiple programming paradigms: object-oriented, imperative, functional and procedural
  - Object-oriented programming in Python
    - Classes and objects
    - Fields and methods
    - The `self`: Equivalent of `this` in Java
    - The `__init__` method
    - Class and object variables
    - Code example of class and inheritance
  - Deep learning: A brief introduction
    - Neural networks
    - Endless application areas
  - Some machine learning (ML) libraries in Python
    - Essentials for data processing and math: NumPy, SciPy, matplotlib...
    - Scikit-learn: for classical ML algorithms
    - Keras: high-level neural network API
    - Tensorflow: for numerical computation using data flow graphs (basically for neural networks)
    - PyTorch
  - Deep dive into PyTorch
    - History: Torch (Lua)
      - Historical facts
      - Core concepts
      - Overview of bject-oriented aspects
    - History: PyTorch
      - Historical facts
      - Core concepts
      - Overview of object-oriented aspects

        - Major elements of PyTorch:
            - PyTorch tensors
            - Mathematical operations
            - `torch.autograd` module for automatic differentiation
            - `torch.optim` module for optimization algorithms
            - `torch.nn` module for defining neural network
    - Code example: An image classifier in PyTorch
        - The data: Fashion MNIST dataset
        - The model: Convolutional neural network (CNN)
        - Imports and essential hyperparameters
        - Data loading
        - The CNN
        - Training the model
        - Evaluating the model
        - Visualizing the loss
        - Visualizing the filters

**Intended code examples content and languages/tools/libraries to be used:**

- Example of classes in Python
- Example of PyTorch tensors and numpy-like operations
- Example PyTorch workflow for building a CNN for image classification using the Fashion-MNIST dataset

Source: Fashion-MNIST dataset

**Any target literature or web citations identified to date:**

Literature:

- Torch: a modular machine learning software library
- Comparative Study of Caffe, Neon, Theano, and Torch for Deep Learning
- Introduction to PyTorch
- Automatic differentiation in PyTorch

Web:

- deeplizard PyTorch course
- Fashion-MNIST image classification tutorial