

Week 2: Deep Learning Plan (30 min/day)

Week 2 focuses on building and training neural networks using PyTorch, understanding loss functions, and applying gradient descent for optimization. You'll move from theory to practice by coding your first models.

Day 8: Neural Network Anatomy

- Read: Dive into 'Neural Networks' chapter in the PyTorch documentation.
- Watch: 3Blue1Brown's Neural Networks playlist (first 2 videos).
- Task: Draw a diagram of a simple feedforward network and label the input, hidden, and output layers.

Day 9: Implementing a Simple Network in PyTorch

- Follow the PyTorch tutorial on creating a simple classifier.
- Task: Write a PyTorch class for a network with one hidden layer (ReLU activation).
- Resource: https://pytorch.org/tutorials/beginner/blitz/neural_networks_tutorial.html

Day 10: Loss Functions

- Read: PyTorch loss functions documentation.
- Task: Experiment with `nn.MSELoss` and `nn.CrossEntropyLoss` on small tensors to see how they behave.
- Question: Why is cross-entropy more suitable than MSE for classification?

Day 11: Gradient Descent & Backpropagation

- Read: PyTorch Autograd mechanics.
- Watch: StatQuest video on Gradient Descent.
- Task: Create a small tensor and manually track gradients through an operation.

Day 12: Training Loop

- Follow: PyTorch basic training loop example.
- Task: Implement a full training loop for MNIST with SGD.
- Question: How does batch size affect training speed and accuracy?

Day 13: Activation Functions

- Read: Overview of activation functions in deep learning.
- Task: Compare ReLU, Sigmoid, and Tanh activations by plotting them in Python.
- Question: Why is ReLU often preferred over Sigmoid in deep networks?

Day 14: Mini-Project — Digit Classifier

- Use MNIST dataset.
- Build and train a small feedforward network in PyTorch.
- Test it on unseen data and record the accuracy.

End-of-Week Reflection Questions:

- What was the most challenging concept this week?
- How comfortable are you now with building a model in PyTorch?
- Can you explain gradient descent to someone else without notes?
- If you had more time, what would you expand on from this week's learning?