

# **Deep Learning from Scratch**

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## What I Built

Built deep learning architectures from scratch progressing from simple feed-forward networks to advanced models like Variational Autoencoders. Implemented FFN, CNN (LeNet-5, AlexNet, VGG-11, ResNet), RNN, LSTM with applications including baby name generation, English-French translation with attention, and -VAE with latent space interpolation.

## What I Learned

**Backpropagation is beautiful when you implement it manually.** Building LSTM cells from scratch with NumPy taught me how gradients flow through time and why vanishing gradients happen. The reparameterization trick in VAEs and understanding ELBO optimization gave deep insights into probabilistic modeling.

Also learned that modern architectures (ResNet, attention) solve fundamental problems in gradient flow and information preservation.

## Project

[GitHub Repository](#)

**Architectures:** FFN, CNN variants, RNN/LSTM, Autoencoders, VAE | **Applications:** MNIST/CIFAR classification, sequence prediction, language modeling, translation