Machine Learning and Deep Learning Optimizers Implementation

Artificial Intelligence & Data Science

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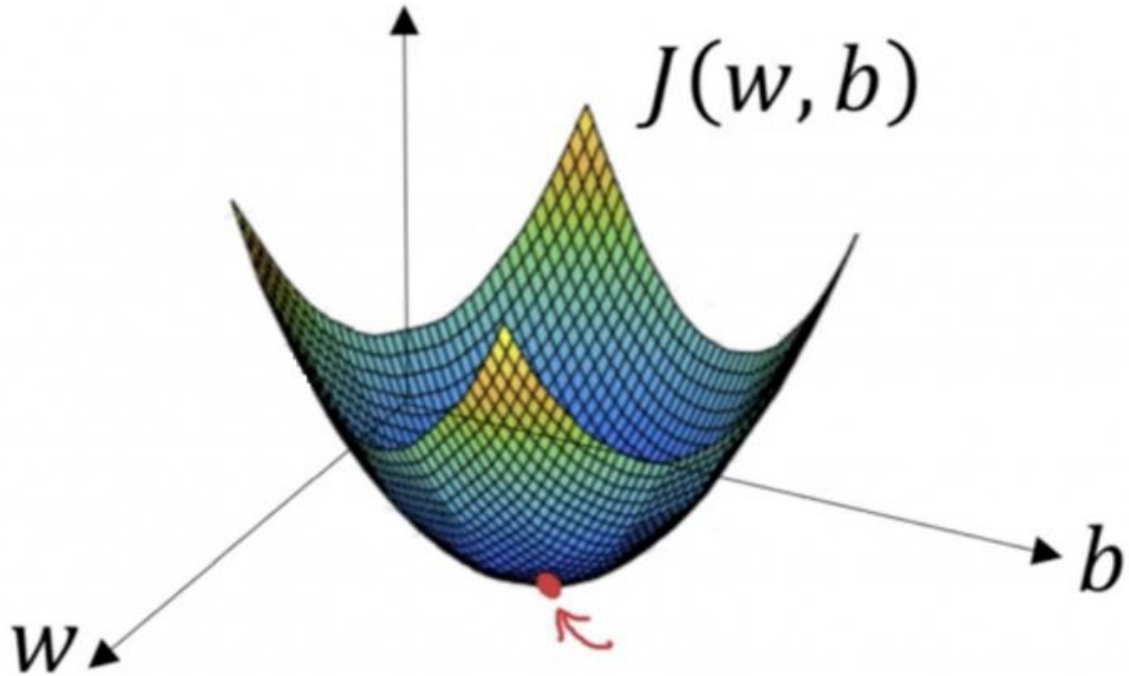
ML&DL Optimizers

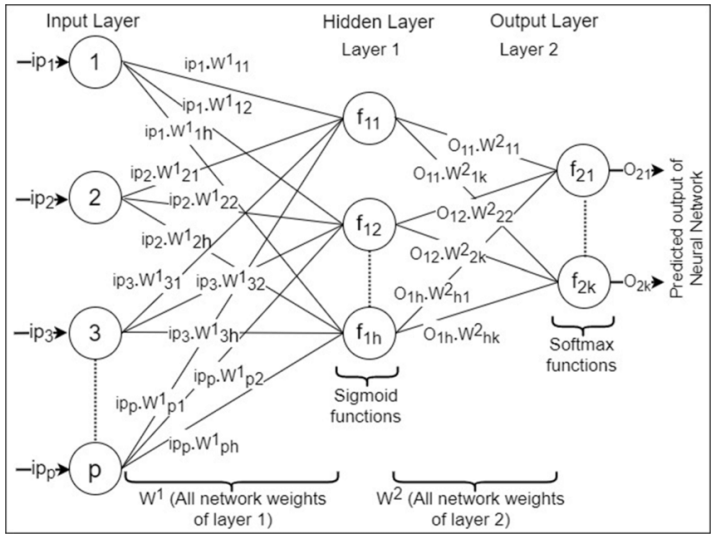
- In **ML&DL**, the **optimizers** are the **algorithms** used to find the best values of model parameters that minimize the model prediction error **(the minimum of loss function)**.



ML&DL Optimizers

- **Optimizers** find the best model parameters of simple single variable and multivariable linear regression models as well as complex and deep learning models.

- **Single Variable LR:** $h_\theta(x) = \theta_0 + \theta_1 x$
- **Multi Variable LR** $h_\theta(x) = \theta_0 x_0 + \theta_1 x_1 + \theta_2 x_2 + \ldots\ldots + \theta_n x_n$



ML&DL Optimizers

- Almost all ML&DL optimizers are **numerical optimization** algorithms such as:
  - Batch Gradient Descent (GD).
  - Stochastic GD (SGD).
  - Mini-Batch GD.
  - Momentum based GD.
  - Nestrov Accelerated Gradient (NAG).
  - Adagrad.
  - RMSProp.
  - Adam.
  - BFGS.

ML&DL Optimizers

- In order to use or even choose in the first place the suitable optimizer to train your model, adjusting hyperparameters, obtain fast and efficient training, and sometimes modify the optimization method, you must understand how the optimizer work.

ML&DL Optimizers

Fully understanding of ML&DL optimizers is crucial.

It is your first and most important step before learning ML&DL.

Master Numerical Optimization for ML&DL (NOFML&DL) in 5 Days

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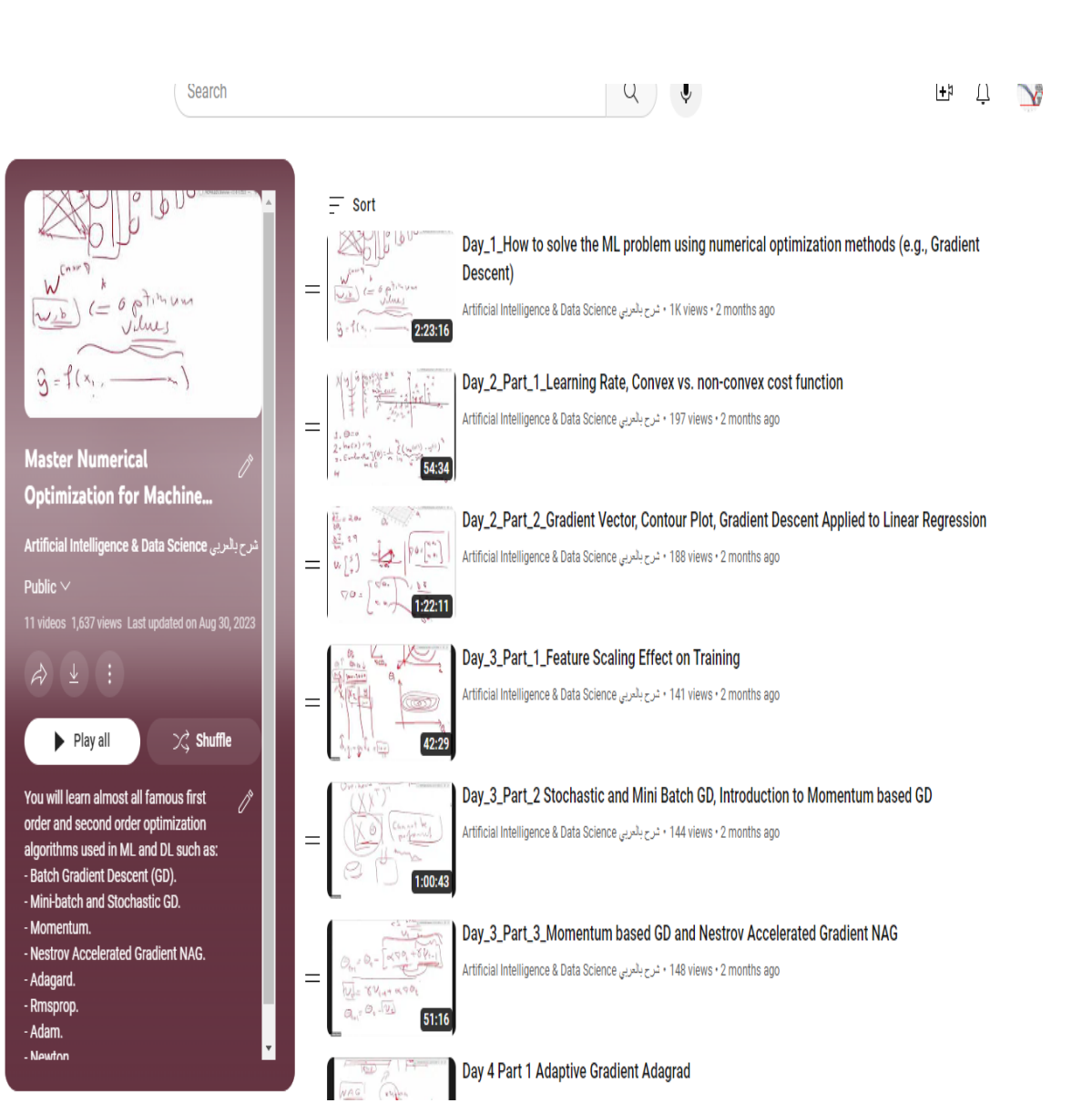
Master NOFML&DL in 5 Days Course Link



Master NOFML&DL in 5 Days Contents

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Batch GD Problems.

GD Variants.

Stochastic GD.

Mini-Batch GD.

GD Challenges.

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How to Understand the Optimizers?

- In order to understand the optimizers thoroughly, you need to implement it from scratch by yourself.
- See the effect of hyperparameters in training.
- Explore this effect by plotting the learning curves.

Machine Learning and Deep Learning Optimizers Implementation

PW 1: Implementation of Batch (Vanilla) GD for single variable LR model.

PW 2: Implementation of Batch (Vanilla) GD for Multi-variables LR model.

PW 3: Implementation of Stochastic GD for Single and Multi-variables LR model.

PW 4: Implementation of Mini-Batch GD for Single and Multi-variables LR model.

Machine Learning and Deep Learning Optimizers Implementation

PW 5: Implementation of Momentum based GD for Single and Multi-variables LR model.

PW 6: Implementation of NAG for Single and Multi-variables LR model.

Machine Learning and Deep Learning Optimizers Implementation

PW 7: **Implementation of Adagrad for Single and Multi-variables LR model.**

PW 8: **Implementation of RMSProp for Single and Multi-variables LR model.**

PW 9: **Implementation of Adam for Single and Multi-variables LR model.**

PW 10: **Implementation of BFGS method for Single and Multi-variables LR model.**

Resources

Master numerical optimization for ML&DL in 5 Days course material.

Data files.

Guided steps code files.

Ideal solution code files.

Attention

- You must do the implementation by yourself.
- Do not jump directly to the ideal solutions.

Enjoy the learning