

IT416: TOPICS IN DEEP LEARNING

Assignment 6 : Application and comparison of different optimizers in optimizing a polynomial function

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1 LEARNING OUTCOME

At the end of this assignment you will learn different kind of optimizers used for deep learning algorithms and its behaviours towards optimizing a particular function.

2 PROBLEM DESCRIPTION

Implement Optimizers like Adam , SGD , rmsProp and Momentum optimizers from scratch in python.

3 IMPLEMENTATION

3.1 Task

- Function to be optimized:

$$f(x, y) = (x + 1.5 - y)^2 + (2.5 + x - xy^2)^2 + (2.625 - x + xy^3)^2 \quad (3.1)$$

- You can use following parameters for respective optimizers:

Adam: $\beta_1 = 0.9$, $\beta_2 = 0.99$, $\epsilon = 10^{-8}$

RmsProp: $\beta = 0.9$, $\epsilon = 10^{-8}$

Momentum: $\gamma = 0.9$

- Implement optimizers - Adam , RMSProp , SGD and momentum-accelerated gradient descent algorithms from scratch.

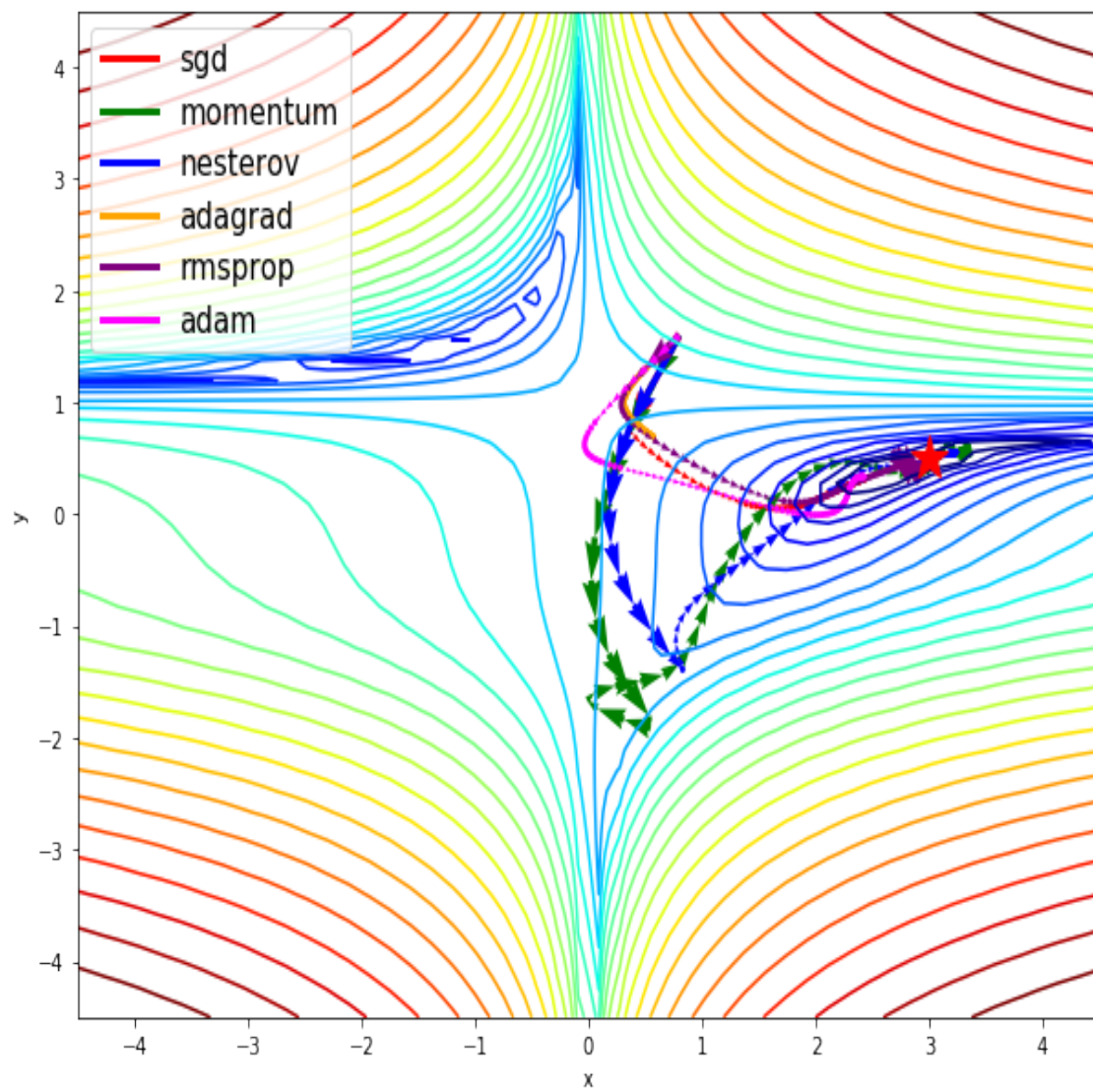


Figure 3.1: Expected output

- You need to plot (contour plot) the paths of points as pictured in figure 3.1 , for each optimizers.
- Comment on the visualizations for each case.

3.2 Points to note

- Visualizations with Explanation is the best way to justify your conclusion

3.3 Instructions

- Implement the algorithms from scratch using Python.

4 SUBMISSION

- You have to submit your assignment in Google Colab notebook (.ipynb file) with proper comments and explanation of your approach.
- Your filename should be named as **LabAssignment6_StudentId** . If your id is 202011001 then filename will be **LabAssignment6_202011001.ipynb**
- The submission deadline for this assignment is **23rd October 2020 11:59 pm**