

## Neural Network from Scratch

**Instruction on how to run my code:**

**For simplicity I have kept 3 separate files that computes based on three different activation function.**

You can run this project on google collab or on GPU machine.

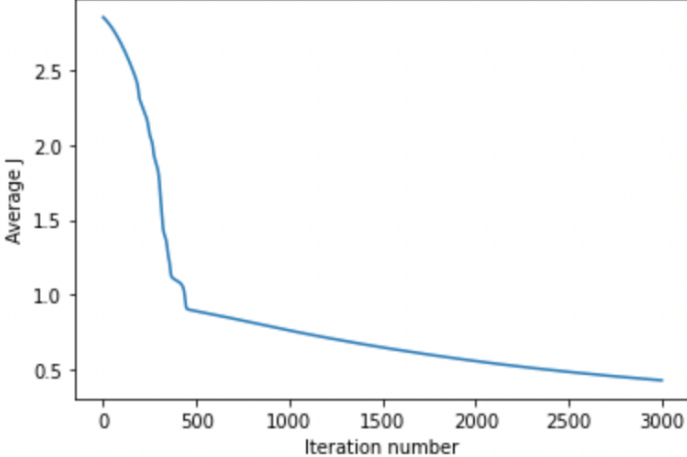
To run this project on Google Collab and use the file named:

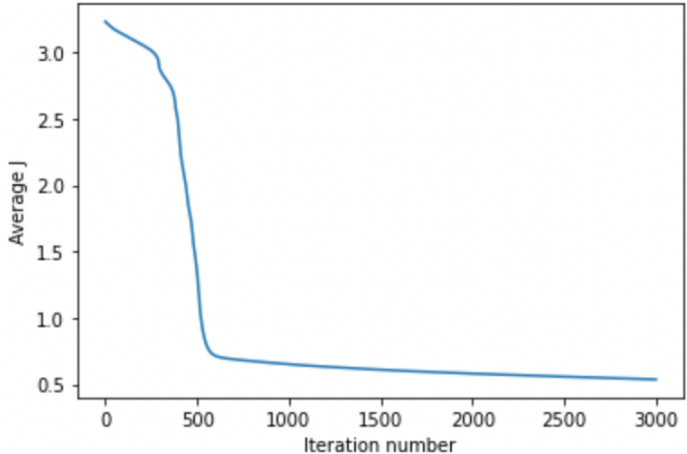
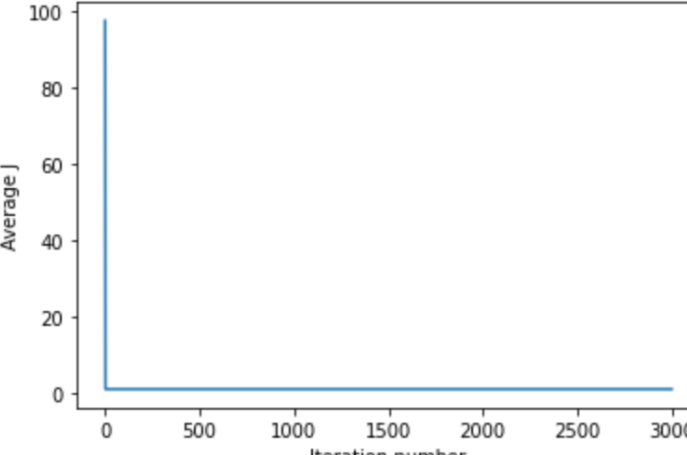
1. **“Neural\_Network\_ukm202\_sigmoid.ipynb” to get the result that uses sigmoid activation function.**
2. **“Neural\_Network\_ukm202\_tanh.ipynb” to get the result that uses tanh activation function.**
3. **“Neural\_Network\_ukm202\_relu.ipynb” to get the result that uses ReLU activation function.**

To run this project on GPU machine and use the file named:

1. **“Neural\_Network\_ukm202\_sigmoid.py” to get the result that uses sigmoid activation function.**
2. **“Neural\_Network\_ukm202\_tanh.py” to get the result that uses tanh activation function.**
3. **“Neural\_Network\_ukm202\_relu.py” to get the result that uses ReLU activation function.**

### Result:

|                                  |  |
|----------------------------------|--|
| With Sigmoid activation function |  |
|                                  | <p>For sigmoid activation function:<br/>Prediction accuracy is 87.0653685674548%</p> |

| <p>With tanh activation function</p> | <div data-bbox="609 241 1291 724"><p>With tanh activation function</p><table border="1"><caption>Data points for tanh activation function graph</caption><thead><tr><th>Iteration number</th><th>Average J</th></tr></thead><tbody><tr><td>0</td><td>3.2</td></tr><tr><td>250</td><td>3.0</td></tr><tr><td>500</td><td>0.75</td></tr><tr><td>1000</td><td>0.65</td></tr><tr><td>1500</td><td>0.60</td></tr><tr><td>2000</td><td>0.58</td></tr><tr><td>2500</td><td>0.56</td></tr><tr><td>3000</td><td>0.55</td></tr></tbody></table></div> <div data-bbox="609 777 1193 840"><p>For tanh activation function:<br/>Prediction accuracy is 86.36995827538247%</p></div> | Iteration number | Average J | 0 | 3.2 | 250 | 3.0 | 500 | 0.75 | 1000 | 0.65 | 1500 | 0.60 | 2000 | 0.58 | 2500 | 0.56 | 3000 | 0.55 |
|--------------------------------------|---|------------------|-----------|---|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| Iteration number                     | Average J   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 0                                    | 3.2   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 250                                  | 3.0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 500                                  | 0.75  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 1000                                 | 0.65  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 1500                                 | 0.60  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 2000                                 | 0.58  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 2500                                 | 0.56  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 3000                                 | 0.55  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| <p>With ReLU activation function</p> | <div data-bbox="609 930 1291 1413"><p>With ReLU activation function</p><table border="1"><caption>Data points for ReLU activation function graph</caption><thead><tr><th>Iteration number</th><th>Average J</th></tr></thead><tbody><tr><td>0</td><td>98</td></tr><tr><td>100</td><td>0</td></tr><tr><td>500</td><td>0</td></tr><tr><td>1000</td><td>0</td></tr><tr><td>1500</td><td>0</td></tr><tr><td>2000</td><td>0</td></tr><tr><td>2500</td><td>0</td></tr><tr><td>3000</td><td>0</td></tr></tbody></table></div> <div data-bbox="609 1449 1234 1512"><p>For ReLU activation function:<br/>Prediction accuracy is 10.43115438108484%</p></div>                  | Iteration number | Average J | 0 | 98  | 100 | 0   | 500 | 0    | 1000 | 0    | 1500 | 0    | 2000 | 0    | 2500 | 0    | 3000 | 0    |
| Iteration number                     | Average J   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 0                                    | 98  |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 100                                  | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 500                                  | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 1000                                 | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 1500                                 | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 2000                                 | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 2500                                 | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |
| 3000                                 | 0   |                  |           |   |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |