

## Experiments Report

Various Kernel Visualizations(Circle Experiment) Github page : [Visuals](#)

Description of the images showed on above link:

1. Images are named as : **MLP(n\_h\_l = 1, n\_n = 32, Learned, K, Run=mean, Y'KY\_n = 90.16)** where ,
  - MLP is the architecture name
  - n\_h\_l := number of hidden layers in the model
  - n\_n := number of neurons in the model
  - Learned, UnLearned means, the kernel after training and before training resp.
  - K1, K2, ... := kernel hidden layer 1, 2 resp., and K(lambda matrix) =  $K1 * K2 \dots$
  - $Y'KY_n := Y'KY / (\text{largest eigen value}(K))$  where Y is the target.
  - Run = mean signifies that the experiment was averaged over 5 runs.
2. **NTK** section on the above link is the plot of NTK kernels for MLPs
3. Similarity **NNGP** section on the above link is the plot of NNGP kernels for MLPs
  - **Each Run Visuals** in the NNGP is the NNGP kernels for each of the 5 runs to explore the kernels further.

All the above experiments data was taken down in this [Sheet](#).

- **sin10\_ratios**(subsheet in the above sheet) contains the values of  $Y'KY_n$  of all kernels for various configs along with the ratios of  $Y'KY_n$ (before training) /  $Y'KY_n$ (after training).
- Same explanation goes for **sin4\_ratios**.

### Kernel Visualization over each epoch : [Visuals](#)

For MLP the change in the kernels structure was observed over each epoch from random initialization to epoch number 100.

Each row in the above link is the kernels heatmap for a particular epoch( row 10 images is kernels after epoch 10)

### Analysis of 4 inputs that are around 10 degrees apart

Top half of circle is slow varying and bottom half is high varying.

$x1 := -30$  ,  $x2 := -20$

$x3 := 40$  ,  $x4 := 50$

Experiment plots are presented on this [Link](#).