**Title – TensorFlow Playground**

**Concept - Neural Network**

**Theory applied to experiment-** Neural networks are computational models inspired by the human brain. They consist of interconnected nodes (neurons) organized in layers. The neural network learns to recognize patterns in data by adjusting the connections based on the input it receives. In this experiment, we explore how a neural network can classify data points into different categories using activation functions and different network architectures.

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| **Materials required** | **Hardware Requirements:**   |  |  | | --- | --- | | **Components** | **Quantity** | | Computer or laptop with internet access | 1 |   **Software Requirements:**   |  |  | | --- | --- | | **Components** | **Quantity** | | Link- [Tensorflow Playground](https://playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDataset=reg-plane&learningRate=0.03&regularizationRate=0&noise=0&networkShape=4,2&seed=0.56705&showTestData=false&discretize=false&percTrainData=50&x=true&y=true&xTimesY=false&xSquared=false&ySquared=false&cosX=false&sinX=false&cosY=false&sinY=false&collectStats=false&problem=classification&initZero=false&hideText=false) | 1 | | Web browser (Google Chrome recommended) | 1 | |
| **Procedure** | **Refer this link**  [**Reference pdf link**](https://drive.google.com/file/d/14G0pjTb1HOrzVxYzYYxFAFJGsaZoQqf-/view?usp=sharing)  <https://youtu.be/rti0Ozfeqn8?si=3ljnPm17W52j_zwm> |
| **Procedure to be performed by student** | **Open the TensorFlow Playground:**   * Navigate to [TensorFlow Playground](https://playground.tensorflow.org).      **Select the Dataset:**   * Choose the dataset to work with. For this experiment, select the **"circle"** dataset from the dropdown menu.      **Configure Network Settings:**   * Set the **Network Shape** to 4,2, indicating 4 neurons in the first layer and 2 in the second layer. * Choose the **Activation Function** as **tanh**.      **Adjust Learning Parameters:**   * Set the **Learning Rate** to 0.03. * Keep the **Regularization Rate** at 0.    **Choose Batch Size:**   * Set the **Batch Size** to 10.      **Data Settings:**   * Ensure that **percTrainData** is set to 50, indicating 50% of the data will be used for training. * Select the option to hide the test data by setting **showTestData** to false.    **Run the Experiment:**   * Click the **“Play”** button to start training the neural network. Observe how the decision boundary evolves as the training progresses.      **Analyze Results:**   * After the training is complete, review the performance of the model. Look for how well it classifies the data points and adjust parameters if necessary for improved accuracy.    **Experiment with Settings:**   * Feel free to change the **network shape**, **activation functions**, or other parameters to see how they impact the model's performance.    **Document Your Findings:**   * Take notes on the performance changes you observe with different settings and how they affect the neural network's ability to classify the data. |
| **Observation /analysis** |  As you change the network shape and learning rate, observe how the decision boundary changes.   Notice how well the model classifies data points. A better model will have a clear boundary separating different classes. |
| **Conclusion** |  Neural networks can learn to classify data by adjusting connections between neurons.   Different settings (like the number of layers or learning rate) affect how well the network performs. |
| **Experiment takeaways** |  Experimenting with different configurations helps us understand how neural networks work.   Hands-on practice is important for learning about machine learning and problem-solving in technology. |
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