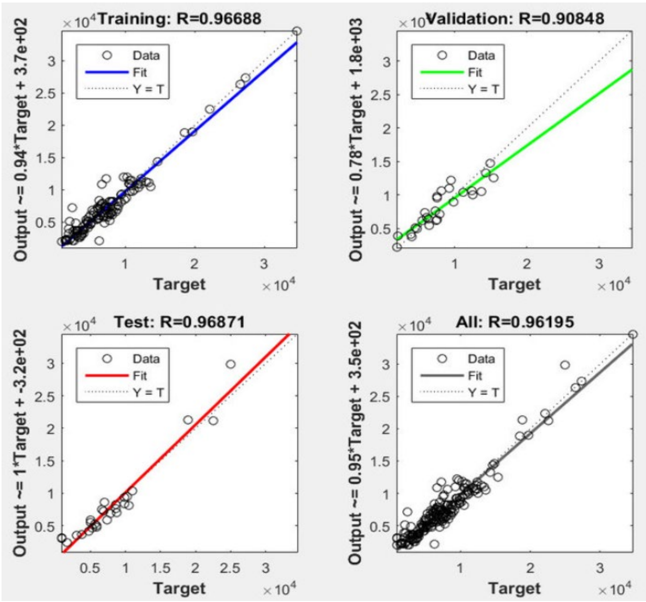

Figure 5. Regression plot for the training, validation, and test of the ANN model

5. Conclusion

An ANN-based supervisory controller is used in the research to show the potential for a smart power control method for independent microgrids that makes use of a variety of energy sources and storage technologies. By using this strategy, even in unpredictably changing environmental conditions, a steady and dependable supply of power may be met to satisfy dynamic demands. The ANN-based supervisory controller improves power management by balancing energy production and consumption while lowering the carbon footprint of the microgrid. The microgrid's sustainability and resilience are further increased by the incorporation of alternative storage technologies and renewable energy sources. The application of the suggested model using MATLAB/Simulink verifies the effectiveness of the smart power control strategy. Given their decentralised nature, efficiency, and integration of renewable energy sources, microgrids are a possible replacement for traditional centralized power systems. It is projected that as microgrid and smart power control research develops, it will support continued efforts to provide sustainable energy solutions, promoting a cleaner, more dependable, and ecologically conscious energy future.

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