For fault, we create all types of faults at varying fault resistances and different incipient angles. A total of 8066 fault cases per line have been generated. Those faults span all types of faults at all distances from 5% to 95% of line length and with fault resistances up to 1000 Ohms. A total of 1120 of fault cases have been also generated for bus faults. These include all faults types with varying incipient angles and various fault impedances including high resistance faults.

In the next batch of simulations, we stop creating fault cases and generate lightning cases. We strike the adjacent lines by lightning strikes with different amplitudes and at different instants of times fixing the waveform rise and tail times. We use an ATP Heidler type lightning with rising time equal to 4 μs and a τ equal to 10 μs. Amplitudes ranging from 5000 A to 30000 A at distances up to 95% have been simulated. It is very rare that a lightning strikes a bus in a substation since buses are almost always inside housing so no lightning strike cases has been generated for the bus under study. A total of 630 cases per line have been generated and used for neural network training. This gives a total of 3150 cases for lightning strikes.

Finally we stop creating fault cases and lightning cases, we energize the lines terminating on the bus at different instants of time. The switch at each end of the line is switched every two degrees making the total number of all cases 360 per line giving a total of 1800 cases of line switching