**IOT Data-Perceptron model**

**Summary**

This dataset contains various features related to network traffic, such as packet counts, sizes, rates, and inter-arrival times, which can be used to detect and classify different types of network attacks. The target variable, **Attack\_type**, indicates the type of attack.

**Dataset Columns**

1. **id.orig\_p**: Original port number of the source.
2. **id.resp\_p**: Response port number of the destination.
3. **proto**: Protocol used (e.g., TCP, UDP).
4. **service**: Type of service (e.g., HTTP, MQTT).
5. **flow\_duration**: Duration of the flow in seconds.
6. **fwd\_pkts\_tot**: Total number of packets sent in the forward direction.
7. **bwd\_pkts\_tot**: Total number of packets sent in the backward direction.
8. **fwd\_data\_pkts\_tot**: Total number of data packets sent in the forward direction.
9. **bwd\_data\_pkts\_tot**: Total number of data packets sent in the backward direction.
10. **fwd\_pkts\_per\_sec**: Rate of packets sent per second in the forward direction.
11. **bwd\_pkts\_per\_sec**: Rate of packets sent per second in the backward direction.
12. **flow\_pkts\_per\_sec**: Rate of packets sent per second for the entire flow.
13. **down\_up\_ratio**: Ratio of download to upload packets.
14. **fwd\_header\_size\_tot**: Total size of headers in the forward direction.
15. **fwd\_header\_size\_min**: Minimum size of headers in the forward direction.
16. **fwd\_header\_size\_max**: Maximum size of headers in the forward direction.
17. **bwd\_header\_size\_tot**: Total size of headers in the backward direction.
18. **bwd\_header\_size\_min**: Minimum size of headers in the backward direction.
19. **bwd\_header\_size\_max**: Maximum size of headers in the backward direction.
20. **flow\_FIN\_flag\_count**: Count of FIN flags in the flow.
21. **flow\_SYN\_flag\_count**: Count of SYN flags in the flow.
22. **flow\_RST\_flag\_count**: Count of RST flags in the flow.
23. **fwd\_PSH\_flag\_count**: Count of PSH flags in the forward direction.
24. **bwd\_PSH\_flag\_count**: Count of PSH flags in the backward direction.
25. **flow\_ACK\_flag\_count**: Count of ACK flags in the flow.
26. **fwd\_URG\_flag\_count**: Count of URG flags in the forward direction.
27. **bwd\_URG\_flag\_count**: Count of URG flags in the backward direction.
28. **flow\_CWR\_flag\_count**: Count of CWR flags in the flow.
29. **flow\_ECE\_flag\_count**: Count of ECE flags in the flow.
30. **fwd\_pkts\_payload.min**: Minimum payload size of packets in the forward direction.
31. **fwd\_pkts\_payload.max**: Maximum payload size of packets in the forward direction.
32. **fwd\_pkts\_payload.tot**: Total payload size of packets in the forward direction.
33. **fwd\_pkts\_payload.avg**: Average payload size of packets in the forward direction.
34. **fwd\_pkts\_payload.std**: Standard deviation of payload size of packets in the forward direction.
35. **bwd\_pkts\_payload.min**: Minimum payload size of packets in the backward direction.
36. **bwd\_pkts\_payload.max**: Maximum payload size of packets in the backward direction.
37. **bwd\_pkts\_payload.tot**: Total payload size of packets in the backward direction.
38. **bwd\_pkts\_payload.avg**: Average payload size of packets in the backward direction.
39. **bwd\_pkts\_payload.std**: Standard deviation of payload size of packets in the backward direction.
40. **flow\_pkts\_payload.min**: Minimum payload size of packets in the flow.
41. **flow\_pkts\_payload.max**: Maximum payload size of packets in the flow.
42. **flow\_pkts\_payload.tot**: Total payload size of packets in the flow.
43. **flow\_pkts\_payload.avg**: Average payload size of packets in the flow.
44. **flow\_pkts\_payload.std**: Standard deviation of payload size of packets in the flow.
45. **fwd\_iat.min**: Minimum inter-arrival time of packets in the forward direction.
46. **fwd\_iat.max**: Maximum inter-arrival time of packets in the forward direction.
47. **fwd\_iat.tot**: Total inter-arrival time of packets in the forward direction.
48. **fwd\_iat.avg**: Average inter-arrival time of packets in the forward direction.
49. **fwd\_iat.std**: Standard deviation of inter-arrival time of packets in the forward direction.
50. **bwd\_iat.min**: Minimum inter-arrival time of packets in the backward direction.
51. **bwd\_iat.max**: Maximum inter-arrival time of packets in the backward direction.
52. **bwd\_iat.tot**: Total inter-arrival time of packets in the backward direction.
53. **bwd\_iat.avg**: Average inter-arrival time of packets in the backward direction.
54. **bwd\_iat.std**: Standard deviation of inter-arrival time of packets in the backward direction.
55. **flow\_iat.min**: Minimum inter-arrival time of packets in the flow.
56. **flow\_iat.max**: Maximum inter-arrival time of packets in the flow.
57. **flow\_iat.tot**: Total inter-arrival time of packets in the flow.
58. **flow\_iat.avg**: Average inter-arrival time of packets in the flow.
59. **flow\_iat.std**: Standard deviation of inter-arrival time of packets in the flow.
60. **payload\_bytes\_per\_second**: Rate of payload bytes per second.
61. **fwd\_subflow\_pkts**: Number of subflow packets in the forward direction.
62. **bwd\_subflow\_pkts**: Number of subflow packets in the backward direction.
63. **fwd\_subflow\_bytes**: Number of subflow bytes in the forward direction.
64. **bwd\_subflow\_bytes**: Number of subflow bytes in the backward direction.
65. **fwd\_bulk\_bytes**: Number of bulk bytes in the forward direction.
66. **bwd\_bulk\_bytes**: Number of bulk bytes in the backward direction.
67. **fwd\_bulk\_packets**: Number of bulk packets in the forward direction.
68. **bwd\_bulk\_packets**: Number of bulk packets in the backward direction.
69. **fwd\_bulk\_rate**: Rate of bulk bytes in the forward direction.
70. **bwd\_bulk\_rate**: Rate of bulk bytes in the backward direction.
71. **active.min**: Minimum active time.
72. **active.max**: Maximum active time.
73. **active.tot**: Total active time.
74. **active.avg**: Average active time.
75. **active.std**: Standard deviation of active time.
76. **idle.min**: Minimum idle time.
77. **idle.max**: Maximum idle time.
78. **idle.tot**: Total idle time.
79. **idle.avg**: Average idle time.
80. **idle.std**: Standard deviation of idle time.
81. **fwd\_init\_window\_size**: Initial window size in the forward direction.
82. **bwd\_init\_window\_size**: Initial window size in the backward direction.
83. **fwd\_last\_window\_size**: Last window size in the forward direction.
84. **Attack\_type**: Target variable indicating the type of attack (e.g., MQTT\_Publish).

**Problem Statement**

Create a perceptron model for binary classification to predict whether the attack type is **DOS\_SYN\_Hping** (1 for attack, 0 for no attack).

**Objective**: Build a perceptron model to classify IoT network traffic data to detect DOS\_SYN\_Hping attacks.

**Steps**

1. **Load and preprocess the dataset**.
2. **Train a perceptron model**.
3. **Evaluate the model**.