

Results

Deep Learning Model

Deep Learning Model: Flavour

Classification Results

- Overall Accuracy : 77% (BDT) → **81%**.
- The most significant improvement: ν_e CC:
 - Precision: 0.76% → 0.89%, Recall: 0.60% → 0.84%.
 - **Why?** *Pre-Train* learns generalizable representation of what a physically EM shower.
- **First Identification of Tau Neutrinos:**
 - Promising first step: **11 true ν_τ CC events correctly identified** (*BDT had 0% Precision*).
 - **Why?** *Pre-Train* created a feature space where rare events could become *separable* from other classes.

Class	Precision	Recall
ν_e CC	0.89	0.84
ν_μ CC	0.82	0.94
ν_τ CC	0.79	0.00
NC	0.73	0.58

Pred.	True ν_e	True ν_μ	True ν_τ	True NC
ν_e	13,395	789	103	726
ν_μ	1,864	72,208	1,705	12,748
ν_τ	0	0	11	3
NC	603	3,537	2,596	18,403