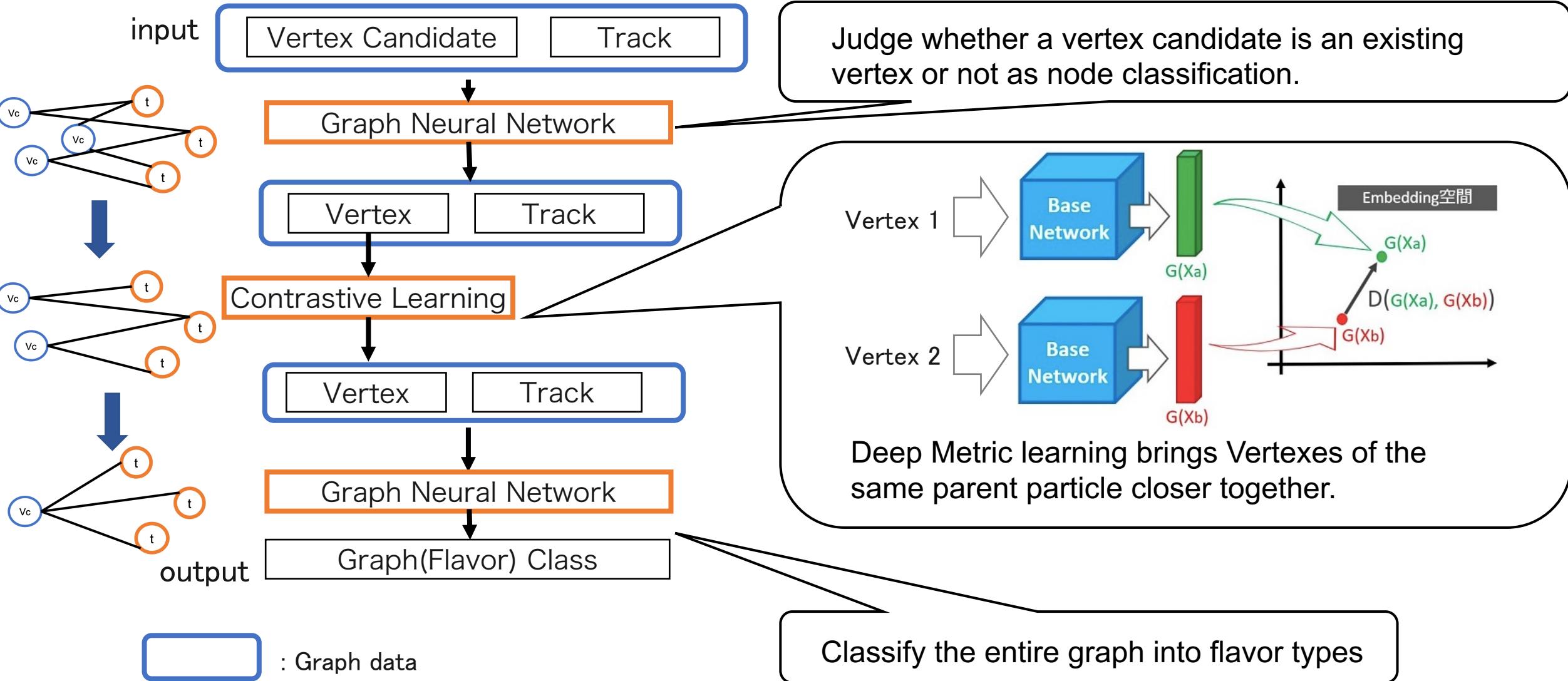# Status Report

**Tomoki Onoe (Kyushu Univ.)**

# Overview of flavor tagging by GNN

# Step1 training

- Data from ILD simulation data (100k events)
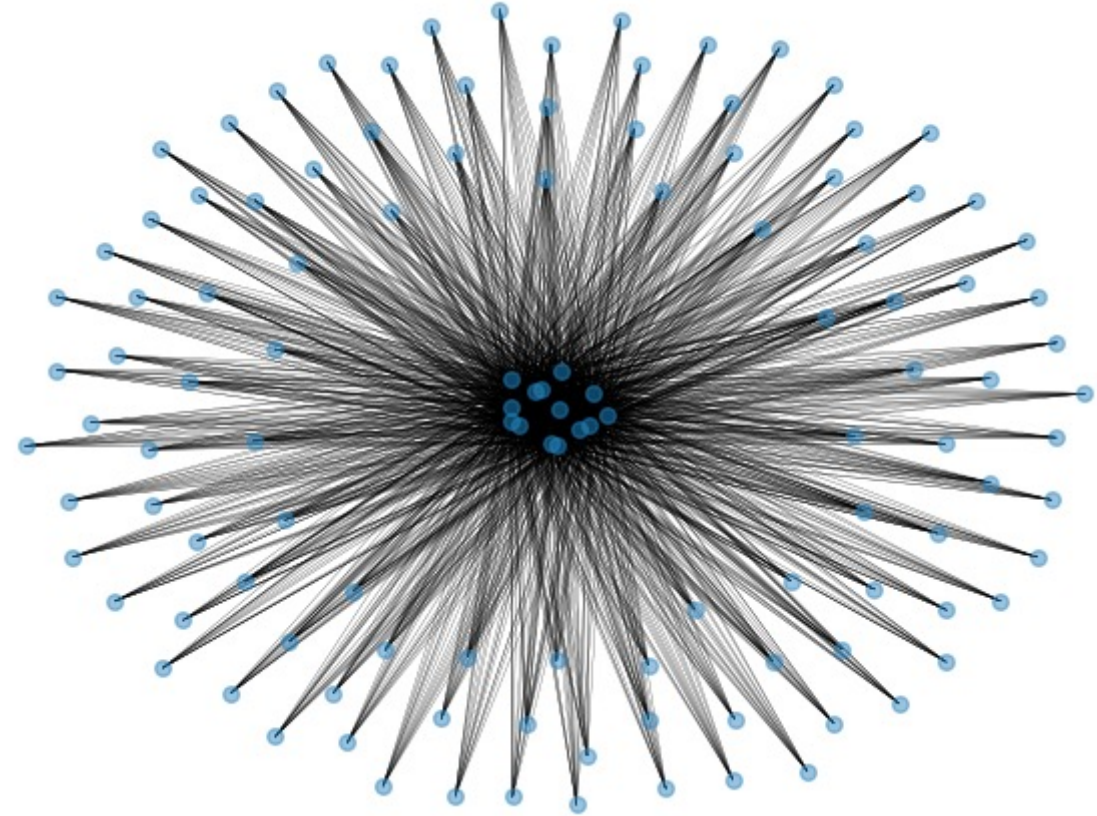
  Features
      Track ... 5 Impact parameters
      Vertex Candidate (VC) ... Position, probability
          (VC created by $\text{Vertex Fitter}^{※}$)
          ※ Use 3-D fitting for vertex position

- Track and VC variables were combined into
  a single tensor by filling in 0.

Input Graph

# Step1 training



Network structure

- Network: GCN(Graph Convolution Network) 3Layer

  <Semi-Supervised Classification with Graph Convolutional Networks: arXiv:1609.02907>

- In step1, we classify nodes to identify VC that do not exist.

- Answer label

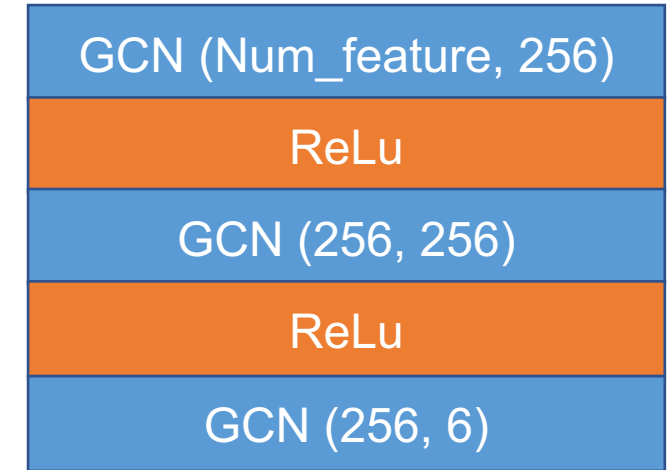  0 : NC ... Non-existent Vertex
  1 : PV ... Pair from primary vertex
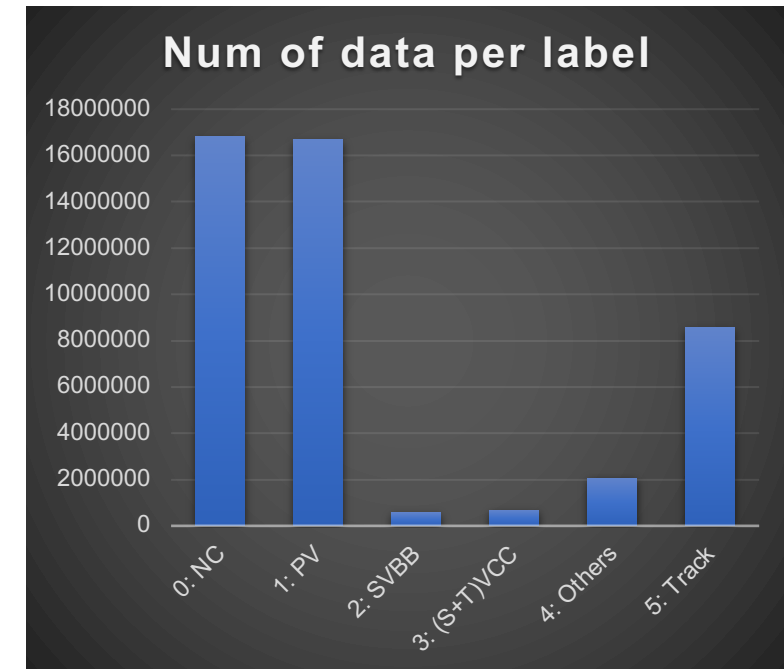  2 : SVBB ... Pair from secondary vertex of b-flavor
  3 : (S+T)VCC ... Pair from secondary or tertiary vertex of c-flavor
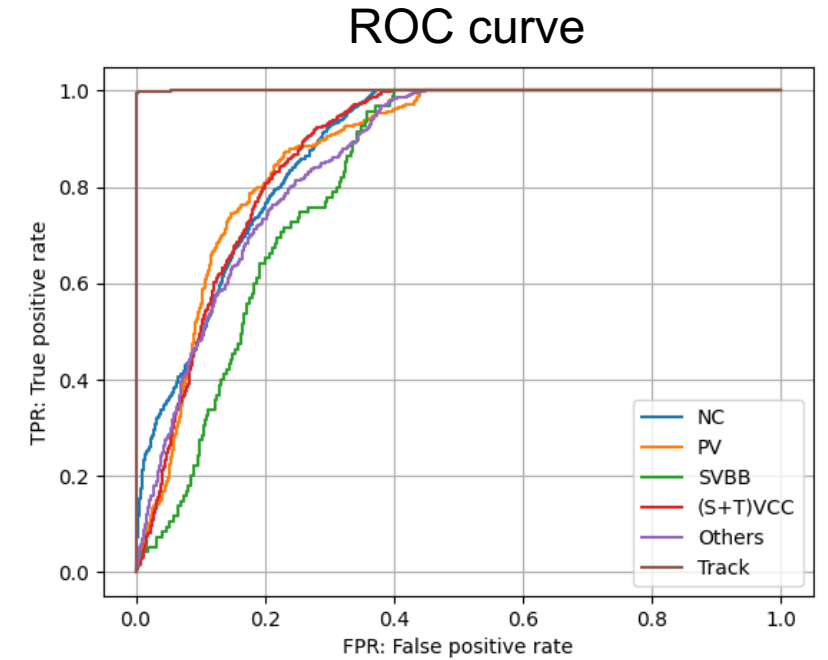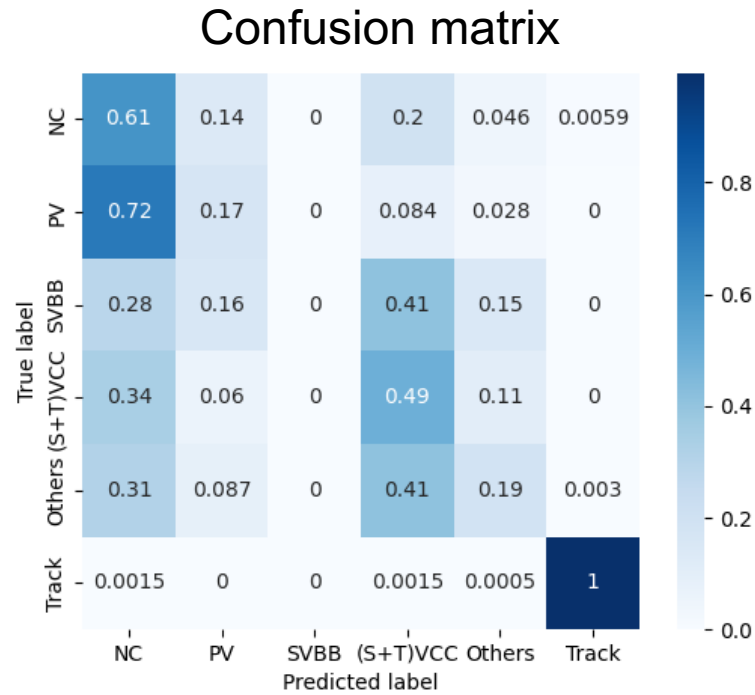  4 : Others ... Other track pair
  5 : Track

# Step1 result



Loss

Accuracy

Confusion matrix
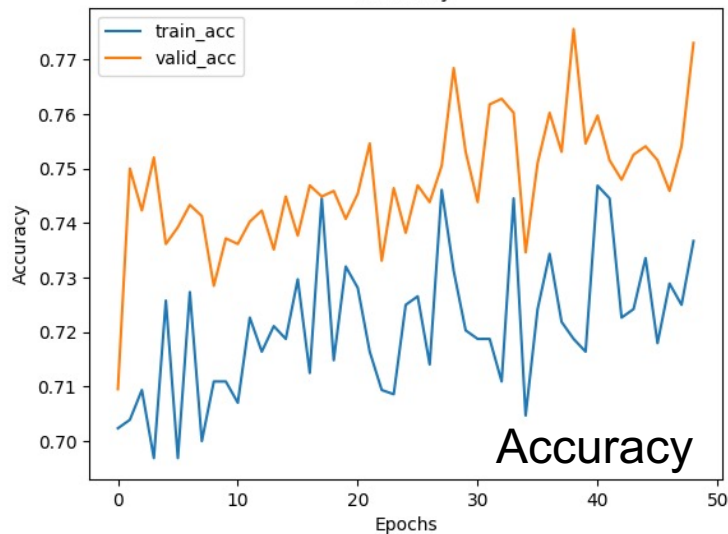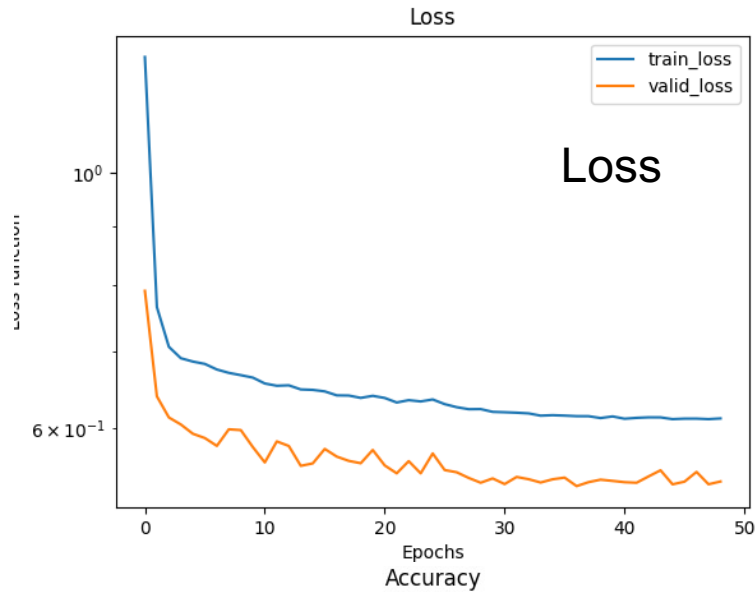


ROC curve



・ SVBB and (S+T)VCC are not identified
due to bias in number of data.

# Prospect

< Step1 >
- Optimization of training (Num of data, ...)

< Step2 ~ >
- Metric learning as clustering
- Learning with the hidden layer between all steps.