Lovely Report

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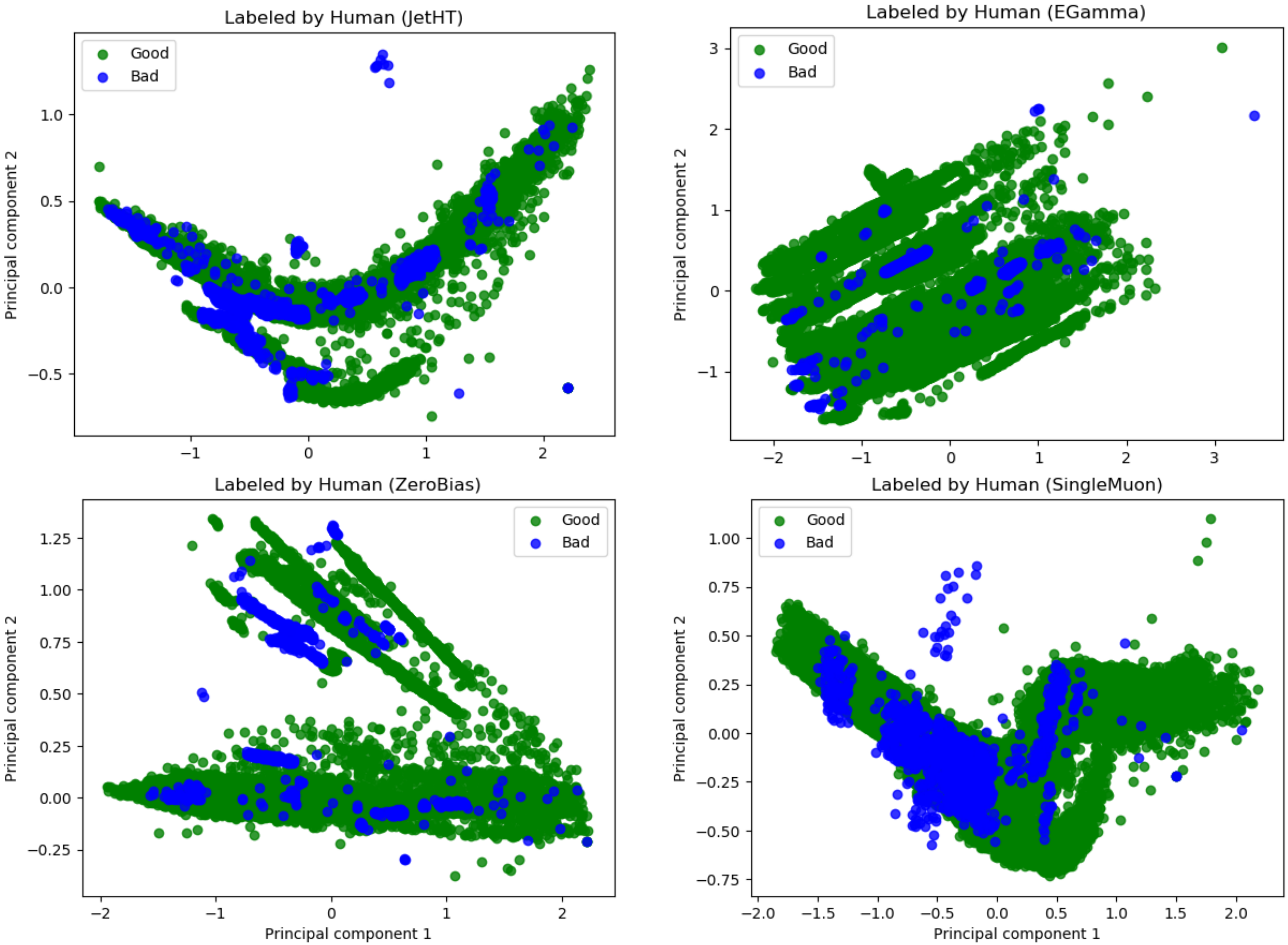
CMS-DQM-WHATEVER4DC

Outline

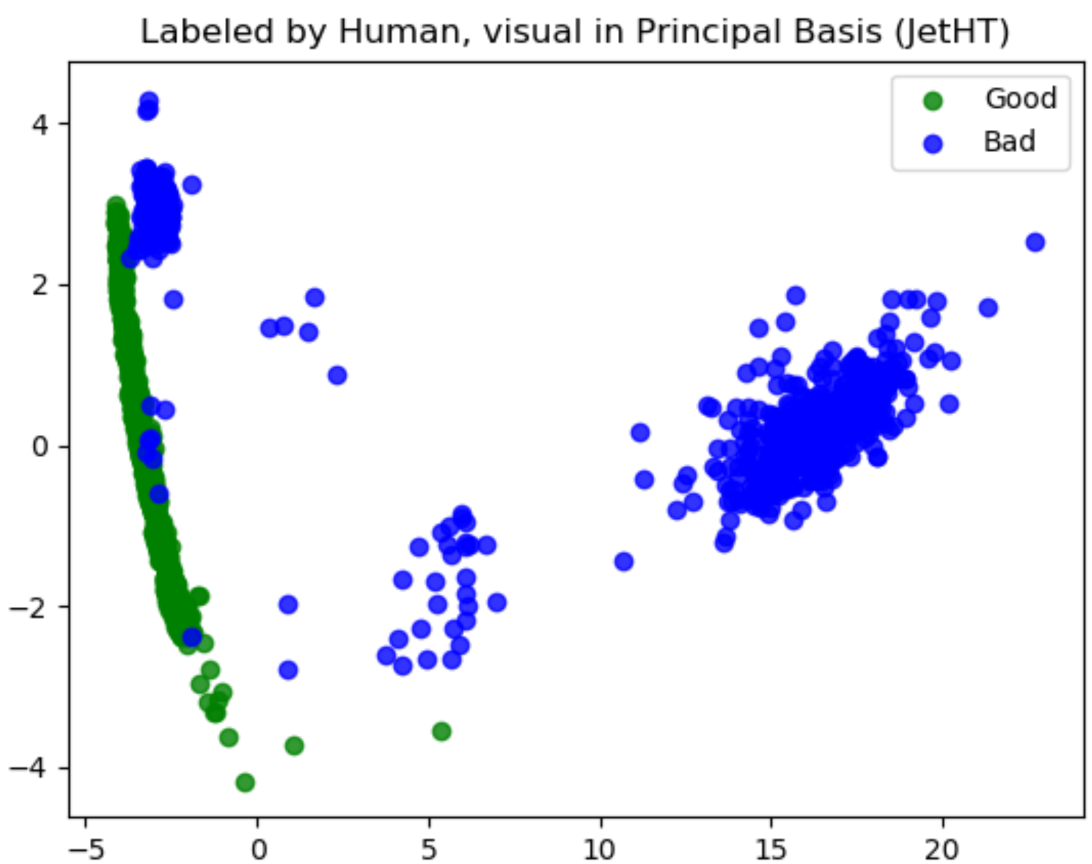
- Similarity of bad and good LS (in 2018)
- Why our model is too aggressive
- Fundamental question
- Solution

Similarity of bad and good LS in 2018 datasets

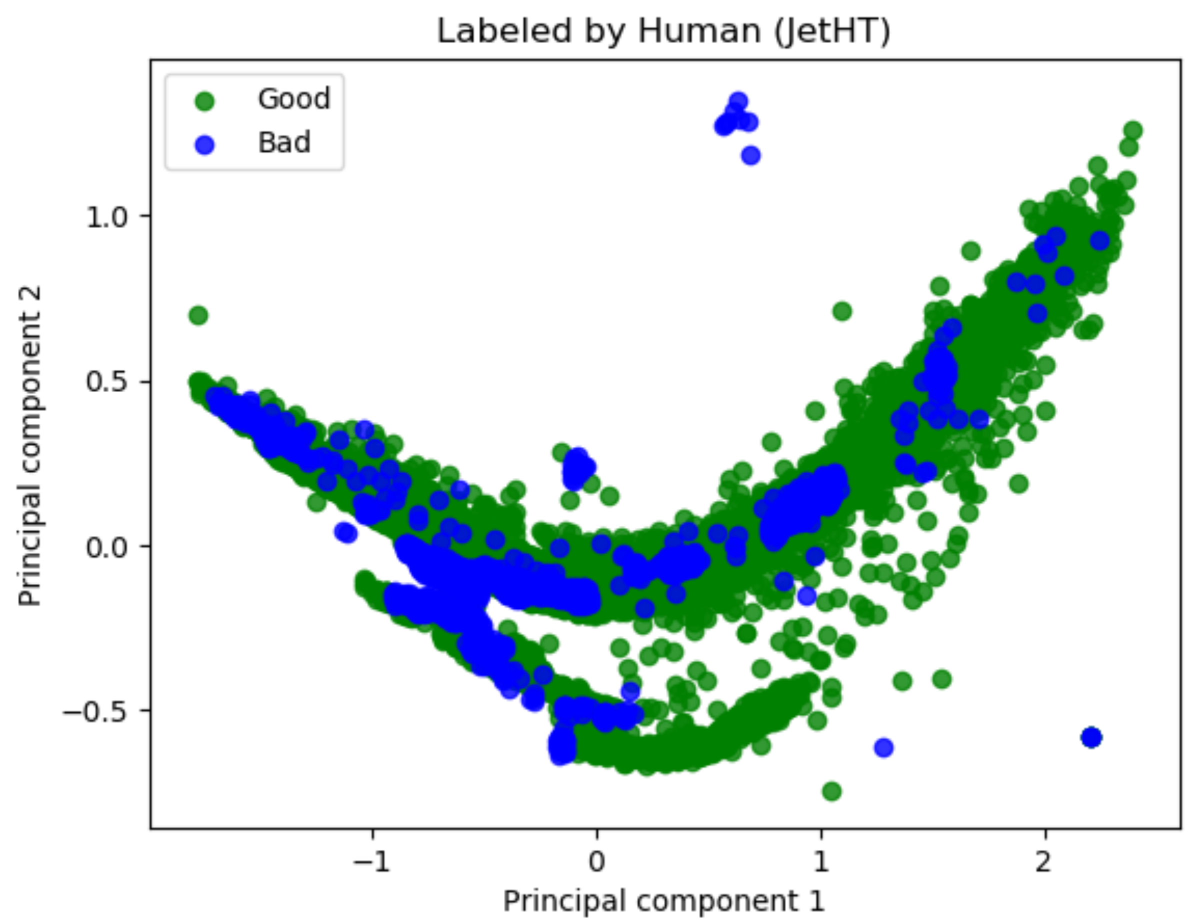
Let’s have a look



JetHT 2016 VS 2018



2016



2018

"..Toy's example vs real life scenario"

Preliminary Results

Model\Channel	ZeroBias	JetHT	EGamma	SingleMuon
One-Class SVM	74.2	74.8 (99.1)	16.4	52.9
Contractive AE	-	83.3 (99.1)	-	-
Vanilla AE	-	81.4 (99.2)	-	-
Sparse AE	-	74.6 (98.9)	-	-
Variational AE	-	74.4 (96.8)	-	-

Table of AUC (for convenient you could consider it as accuracy)

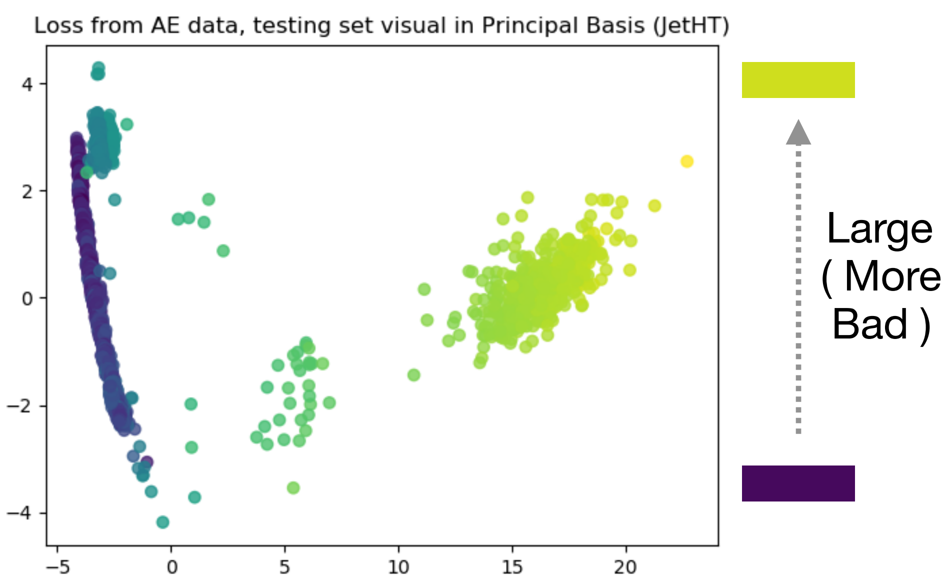
- **2018 datasets** , **2016 datasets**
- Exact same algorithm

Why it’s aggressive

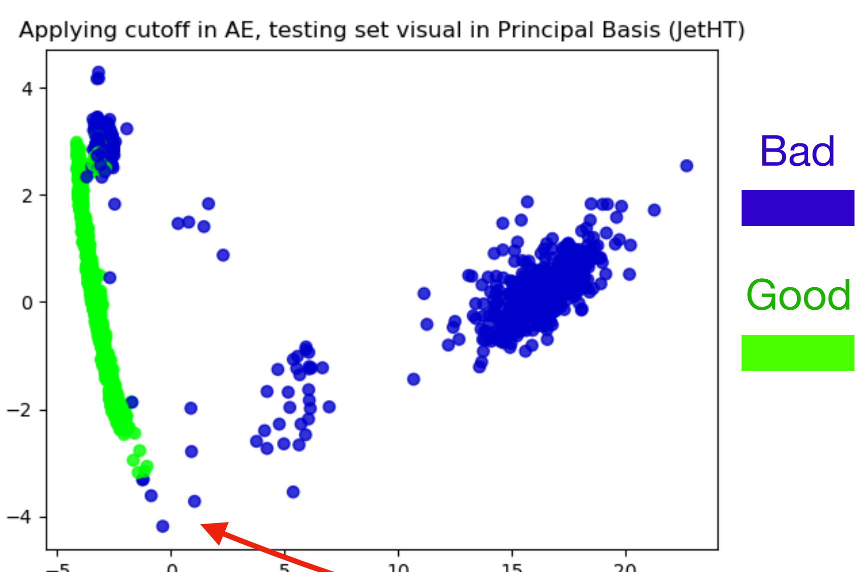
Semi-supervised model is aggressively marking bad LS

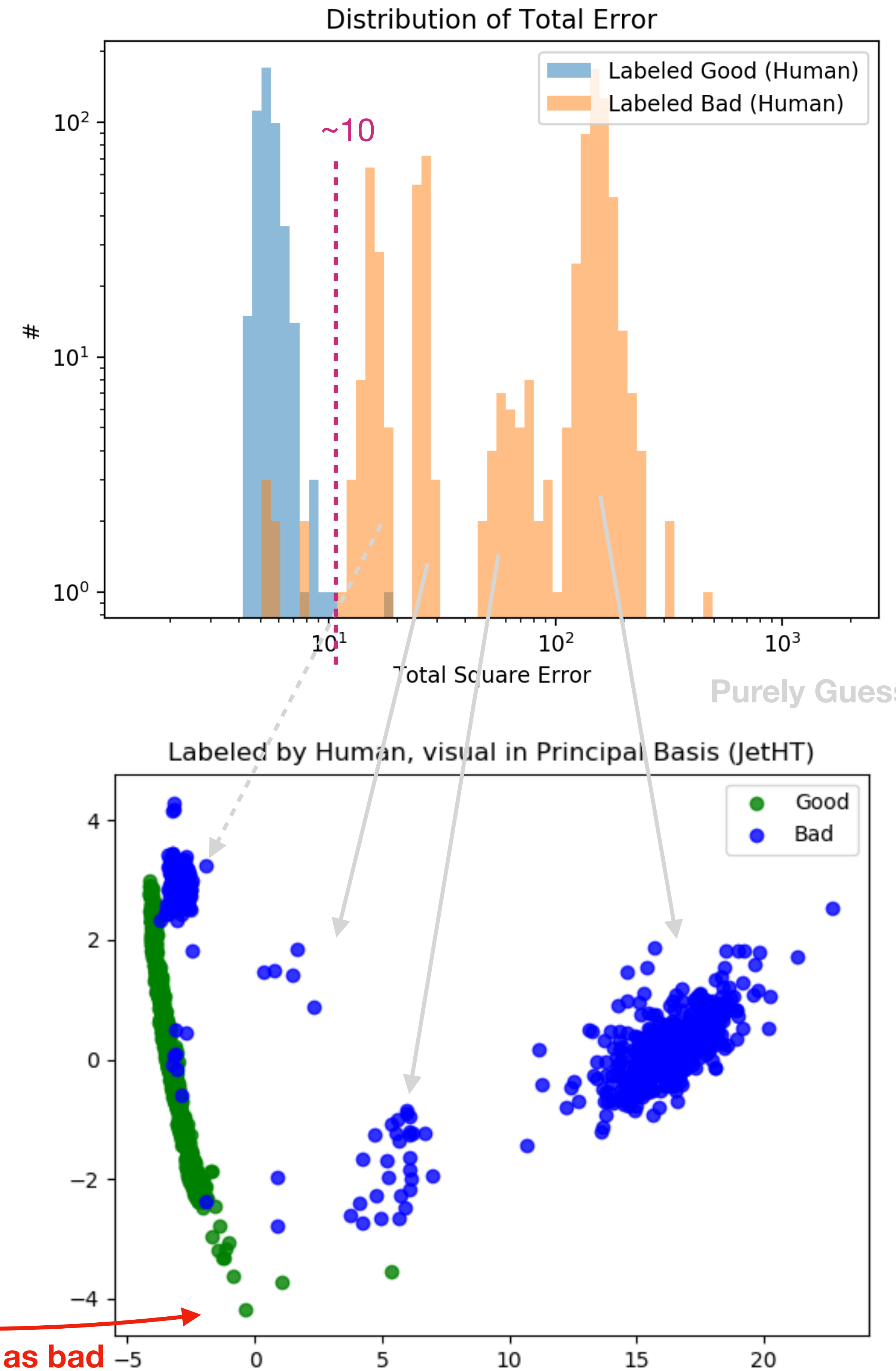
Loss value from Vanilla AE

Loss as color shading



Applying cutoff (MSE > 10.0 is bad)





Anything that rarely happen, the model would mark as bad

Consequence

- Our ML model determine something that it’s not familiar with by marking as bad LS

- As the time evolving, configuration of CMS also evolve then it’s quite dangerous

Fundamental question

But wait

- The accuracy has computed by reference from DCS bits then
- If we trust DCS bits to be a “ground truth”:
  - why we need Autoencoder
- else:
  - Require datasets from simulation of known bad scenario that DCS bits couldn’t do
  - If we could provide simulation of bad scenario data to model:
    - When it’s disagree with DCS bits when we implemented, how could we trace back to prove

Solution ?

Malfunction Spotter

- Objective
  - Inspect detector malfunction in lumisection granularity which shifter does inspect in run granularity
- Supervised
- Input (x):
  - Physics object
  - Occupancy of sub-detector
- Label (y): status of detector which we could get from RR

Malfunction Spotter

- Model Candidate
  - Decision Tree
  - Random Forest
  - Neural network with **probabilistic output** such as sigmoid to tell "level of confidence" for malfunction in each sub-detector
- And again!
- If model prediction and RR is disagree:
  - Of course we have to call the expert as shifter does