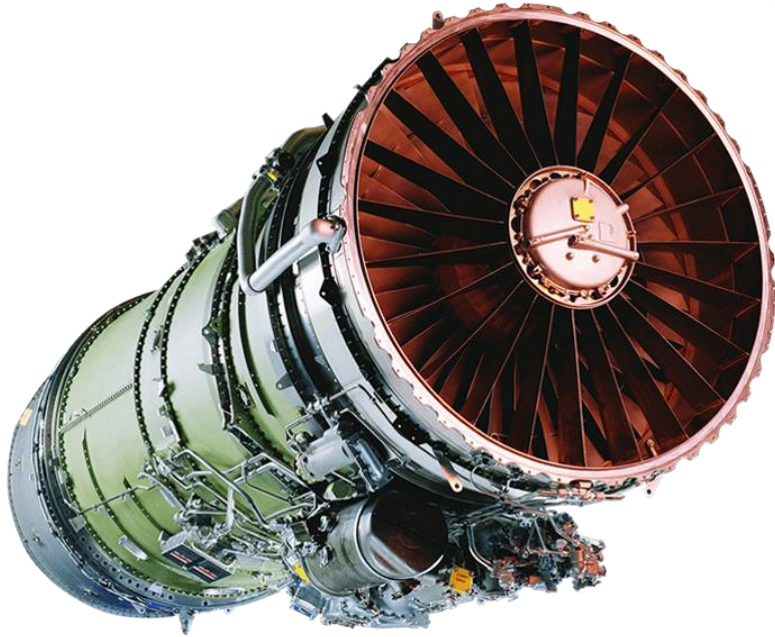


# GAS TURBINE ENGINE FAULT DETECTION

Soodanbek K., Andrey Z., Igor U.



Gas Turbine engines are complex units.  
Detecting faults allow to:

- Save human lives
- Save money
- Maintain the equipment in a good condition

# Approaches

## 1. Data driven

- Main problem: insufficient amount of labeled data

## 2. Hybrid modeling

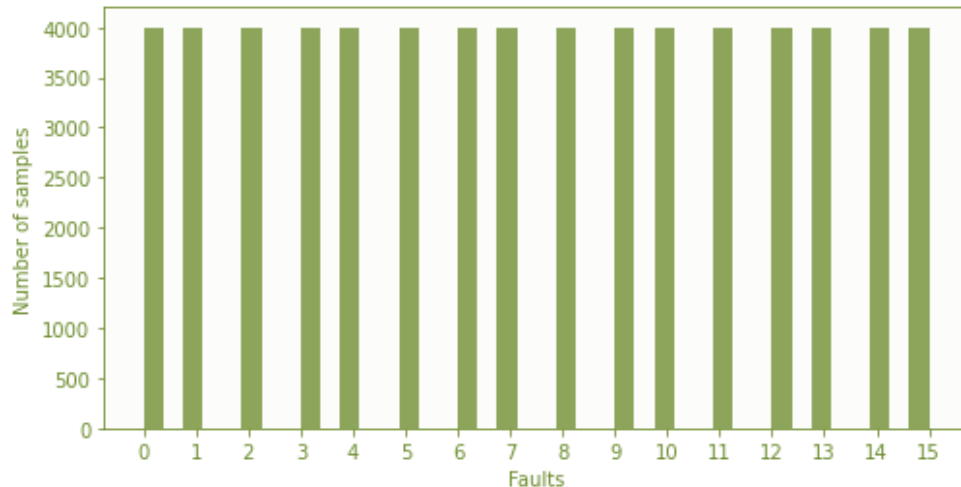
- Resolves the issue



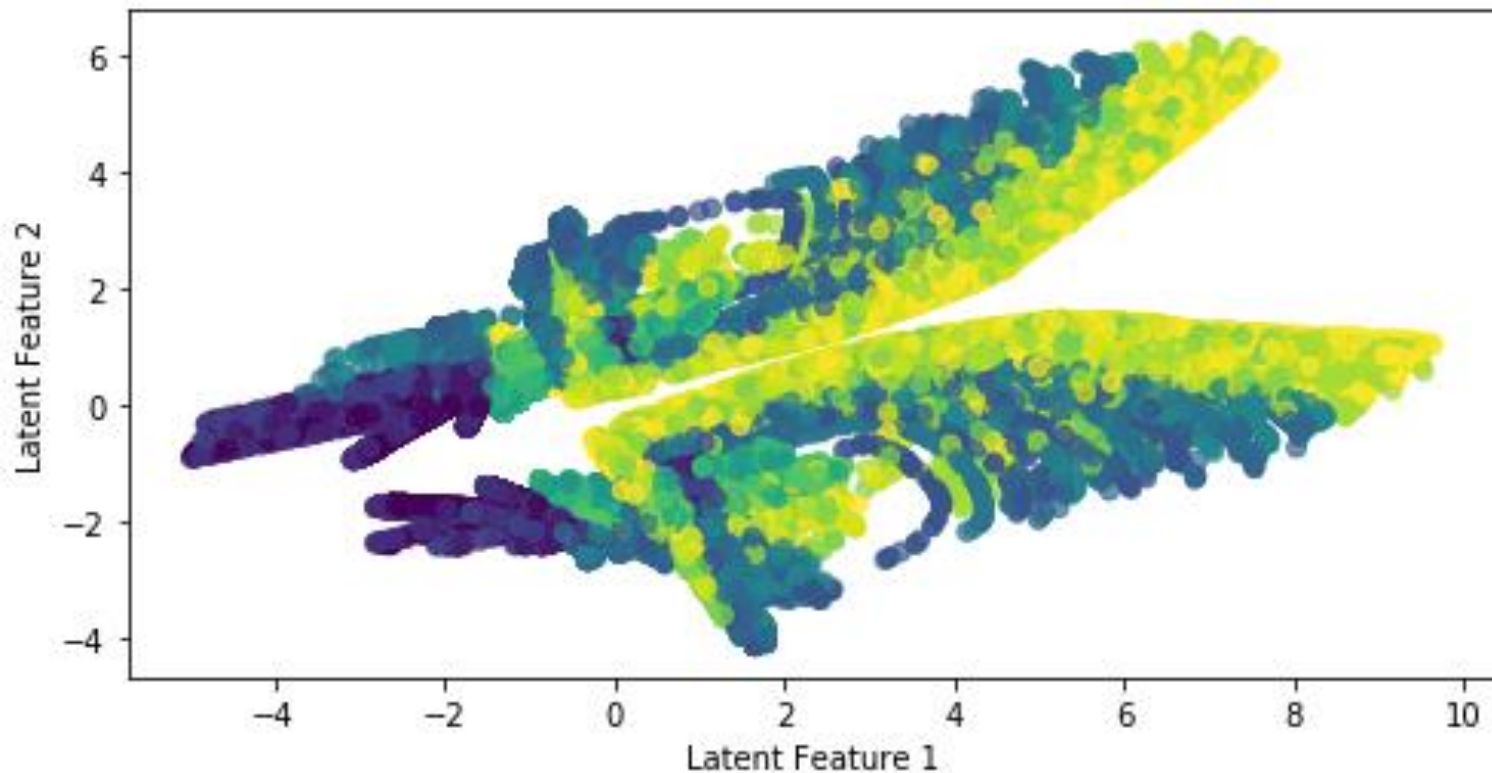
Physical model of Gas Turbine Engine JT8D:

28 features (23 relevant features), 16 targets (fault cases)

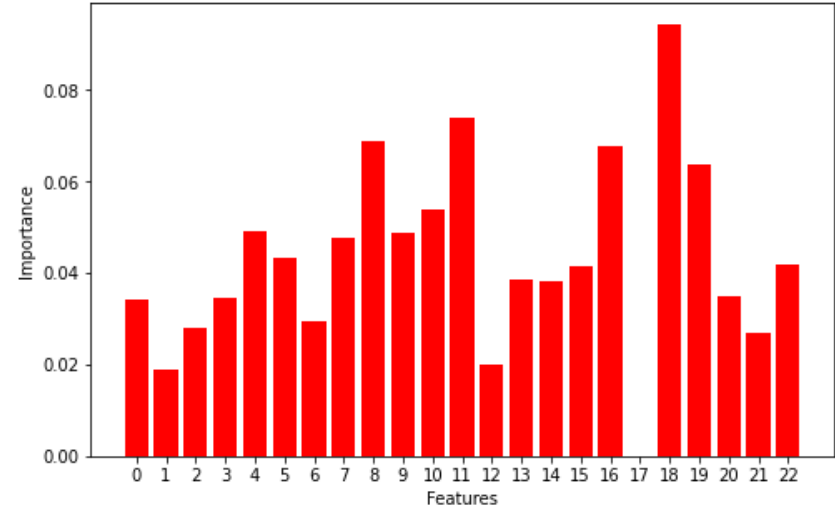
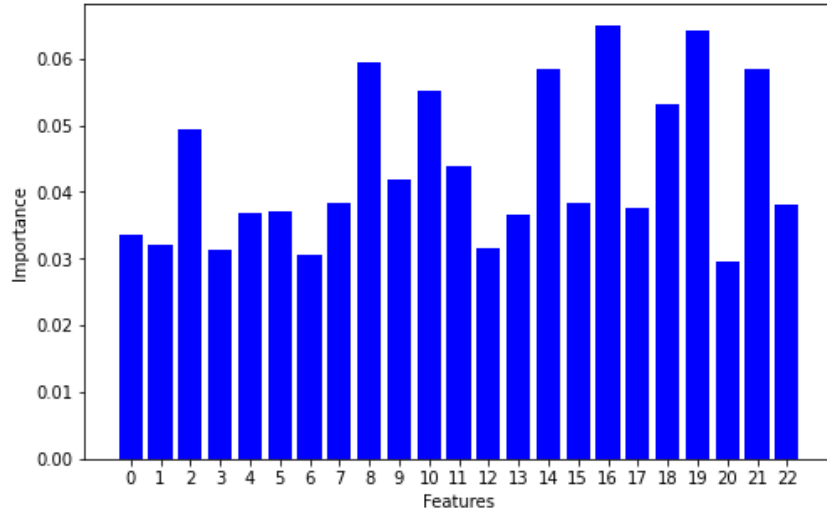
- Initial: 64K samples
- Final: 144K samples



# Dataset in 2D Latent Space



# Feature Importance



- HPC pressure ratio
- HPC revolutions per minute
- Pressure after turbine

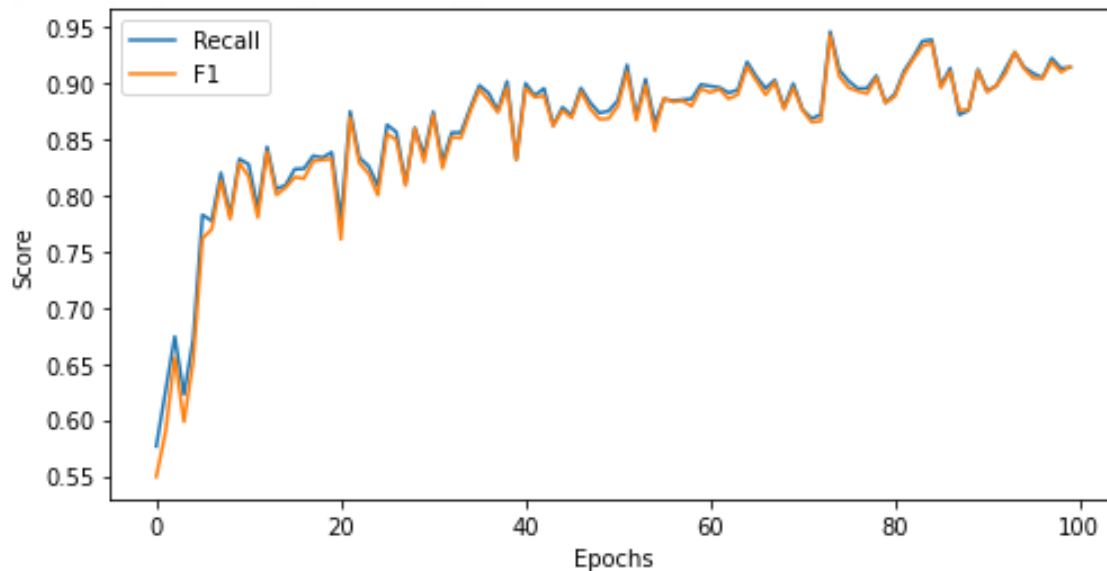
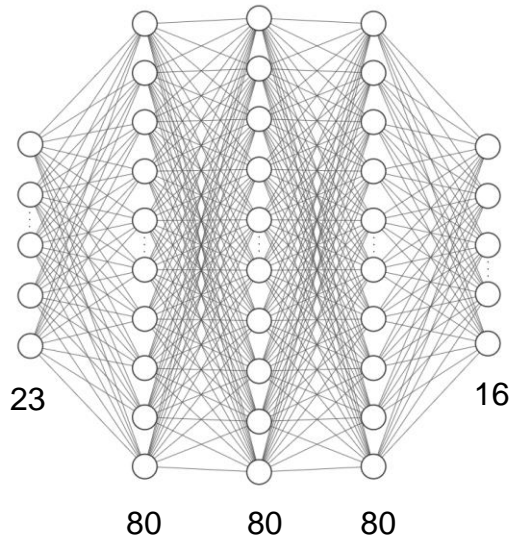
# Comparison of ML models

	Logistic Regression	Random Forest*		XGBoost
Recall	0.51	0.86	<b>0.93</b>	0.64
F1	0.49	0.86	<b>0.93</b>	0.63

\*Enlarged dataset



# Multilayer Perceptron



Recall	F1	Epoch
0.96	0.95	93



# Stacking

## Structure

XGBoost					
Extra Trees	Extra Trees	Random Forest	Random Forest	XGBoost	XGBoost

	Stacking
Recall	0.93
F1	0.93



Thank you for attention!