

ML4Science

Week 2 meeting

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Outline

1. Training of our first Fully Connected Neural Network
 - Architecture of the network
 - Plot of the results
2. Problems & Questions

Architecture

As discussed together last time, we started working with the following architecture:

```
self.l1 = nn.Linear(num-feature,64,dtype=dtype)
```

```
self.l2 = nn.Sigmoid()
```

```
self.l3 = nn.Linear(64,128,dtype=dtype)
```

```
self.l4 = nn.Sigmoid()
```

```
self.l5 = nn.Linear(128,256,dtype=dtype)
```

```
self.l6 = nn.Sigmoid()
```

```
self.l7 = nn.Linear(256,1,dtype=dtype)
```

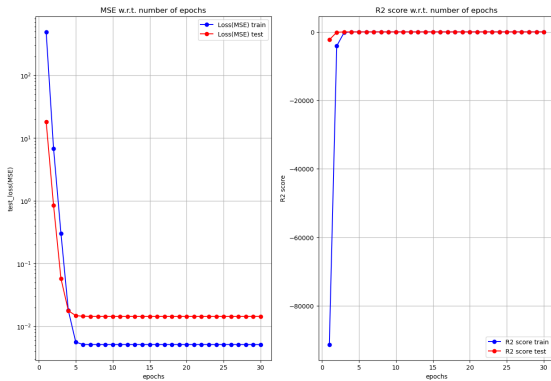
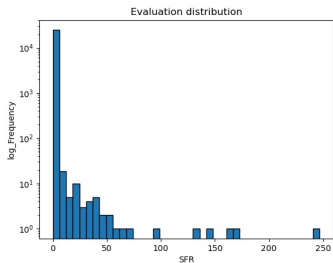
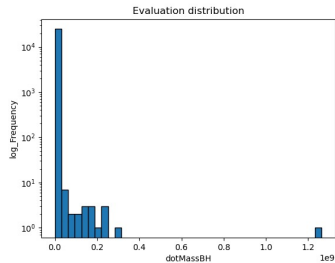
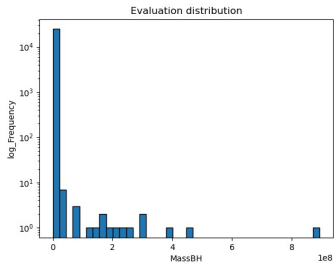


Figure 1: Plot after 30 epochs

Problems and questions

Given the plot of the slide before, we go back into our data to understand why we have such bad results. We realised the following facts:

- *MassBH*, *dotMassBH*, *SFR* are zero almost everywhere $\forall z$ and $\forall LH$.
- The NN start to give us as output a vector with all values equals after a very few epochs.
- Even using all the features, and not the ones we decided to keep last time our NN performs really bad (R^2 is circa zero).
- All the features are really skewed.



Questions

- Is it normal to have so many zeros in those features?
- Why our NN gives us a vector with the same number? Is it due to Sigmoid? We think that this is the reason why we got R^2 equal to zero.