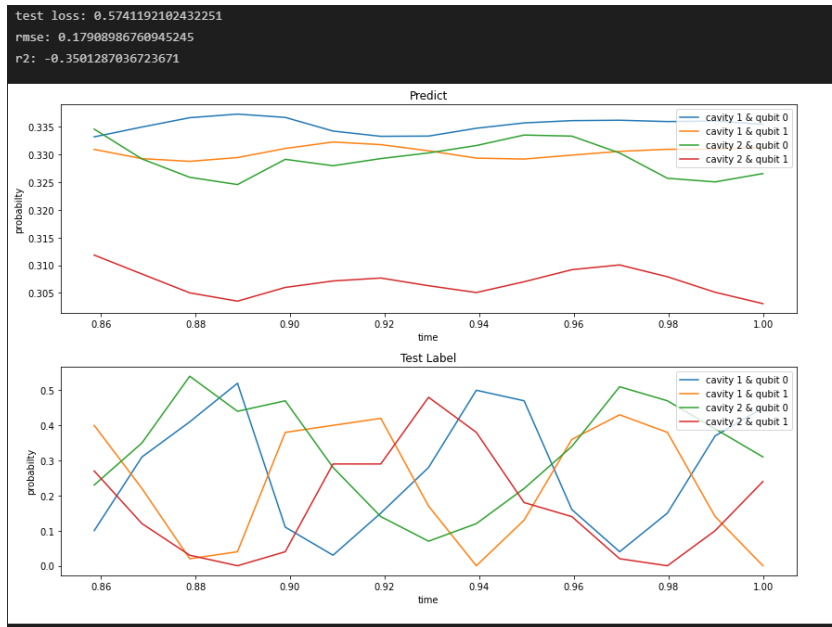


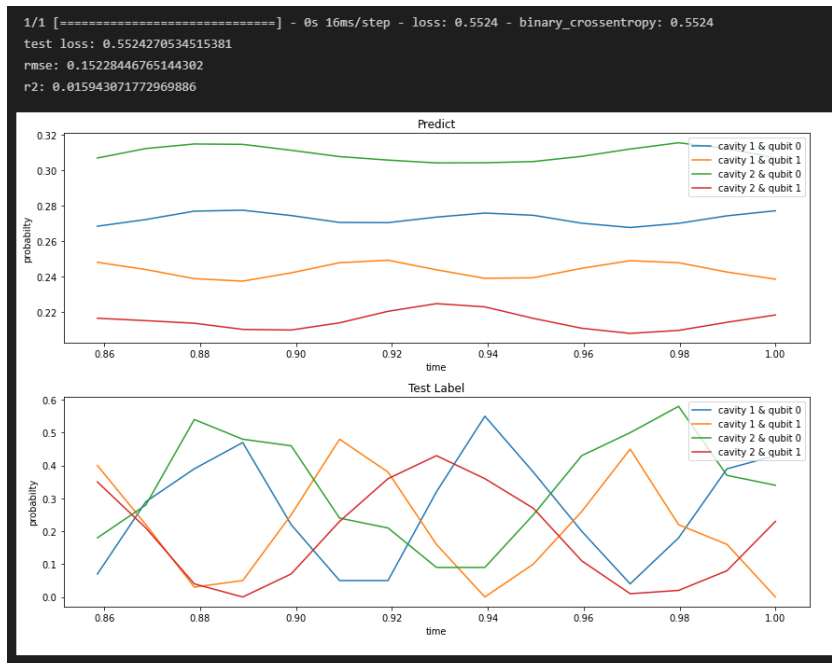
quantim time evolution 결과

1. Cavity = 1 , qubit = 0, 중첩상태, 0초부터 1초까지 100번의 샘플링

A. Epochs = 10

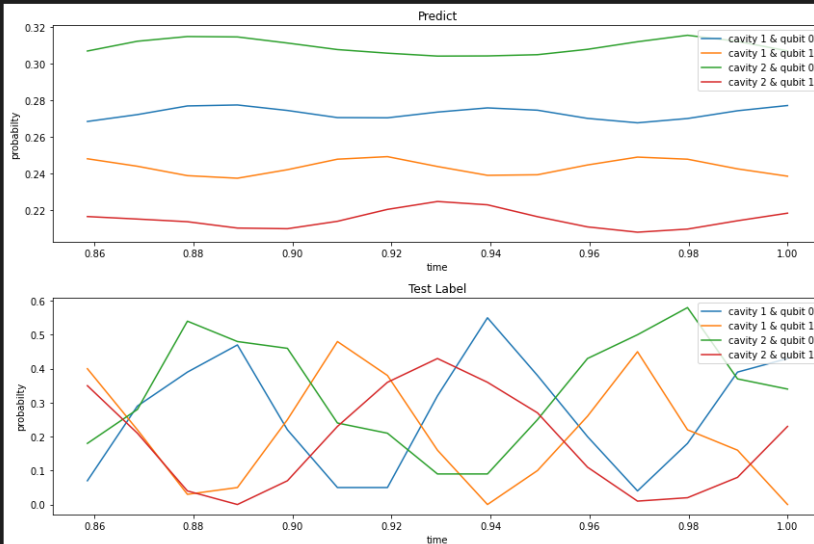


B. Epochs = 50



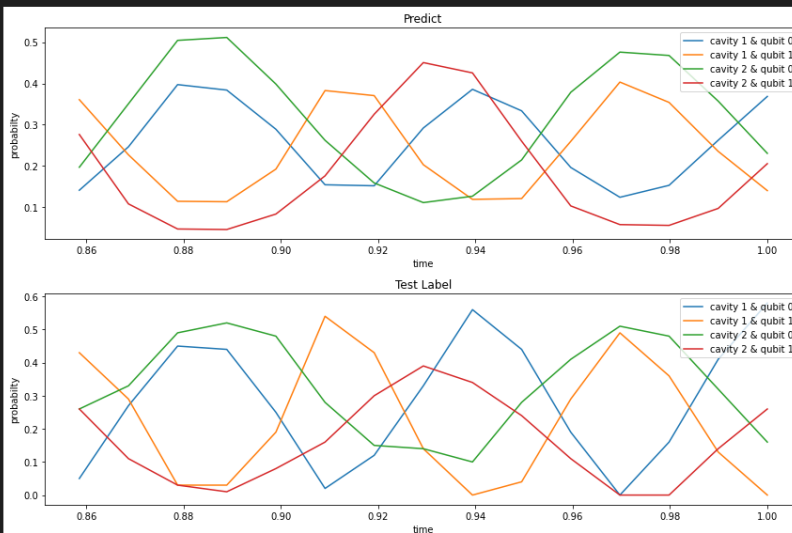
C. Epochs = 100

```
1/1 [=====] - 0s 16ms/step - loss: 0.5524 - binary_crossentropy: 0.5524
test loss: 0.5524270534515381
rmse: 0.15228446765144302
r2: 0.015943071772969886
```

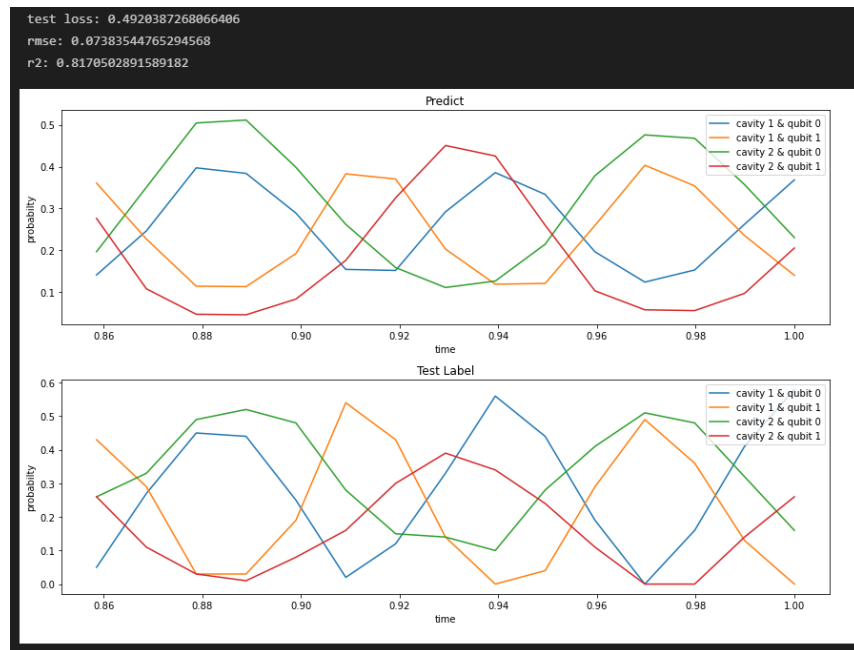


D. Epochs = 150

```
test loss: 0.4920387268066406
rmse: 0.07383544765294568
r2: 0.8170502891589182
```



E. Epochs = 200



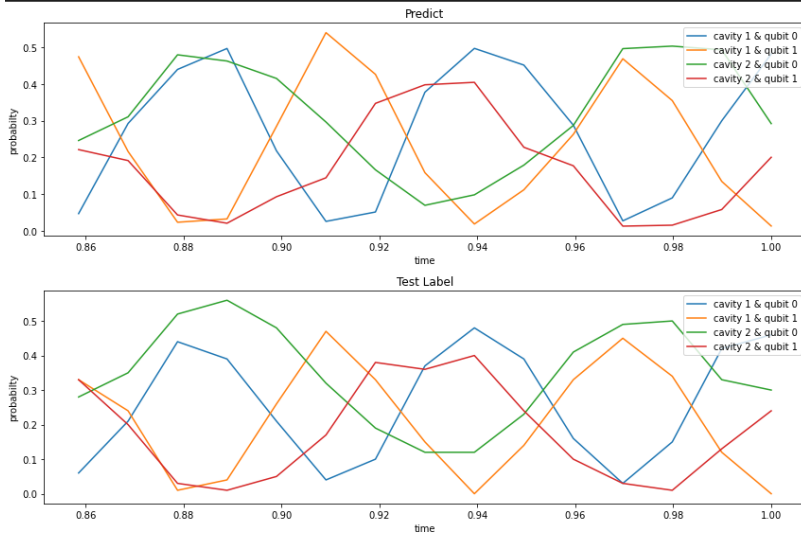
F. 결과

Epochs	R2 score
10	-0.3501
50	0.0159
100	0.6578
150	0.8170
200	0.8168

2. Cavity = 1 , qubit = 0, 중첩상태, 0초부터 1초까지 100번의 샘플링

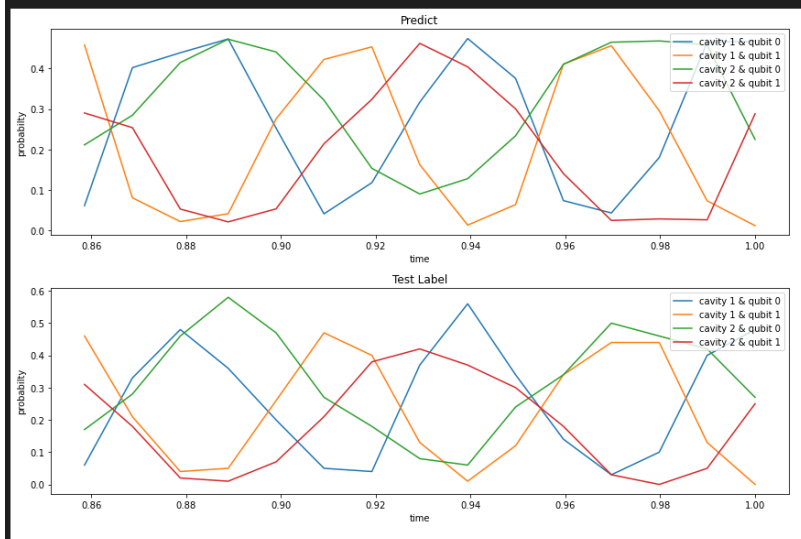
A. Transformer Conv, epochs = 100

```
test loss: 0.49210330843925476
rmse: 0.05775502310024688
r2: 0.846731591190421
```



B. Transformer Conv, epochs = 150

```
test loss: 0.484744131565094
rmse: 0.052189556864285926
r2: 0.9001245864286161
```

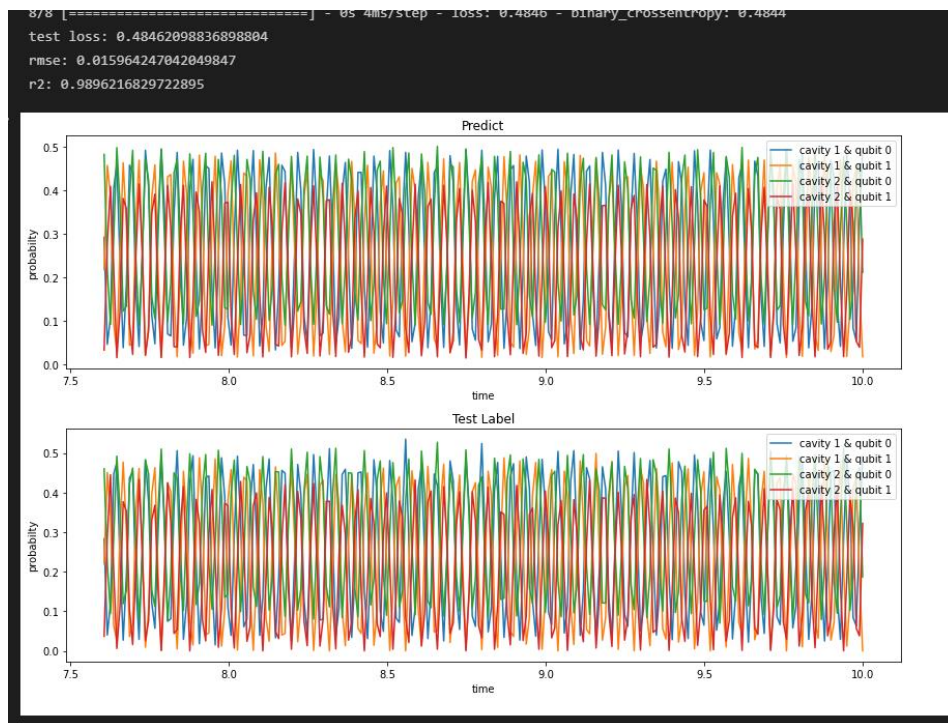


C. 결과

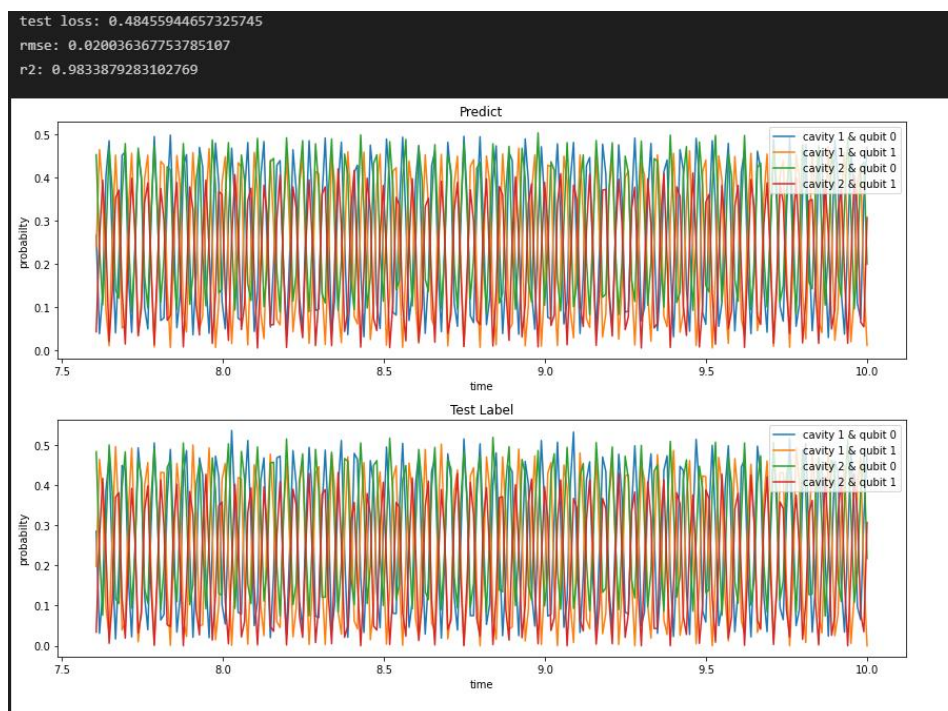
동일 epochs 조건에서 Transformer convolution 성능이 더 좋음

3. Cavity = 1 , qubit = 0, 중첩상태, 0초부터 10초까지 1000번의 샘플링 time 샘플링을 1000까지 증가 후 동일 epochs에서 두 모델을 비교

A. Bidirectional LSTM, epochs = 150



B. Transformer Conv, epochs = 150



C. 결과

Time samples가 낮을 때는 Transformer Convolution 모델이 더 뛰어났으나 Time samples 이 1000일 경우 BiLSTM 모델이 근소하게 좋은 예측을 했고 차이는 거의 없다.