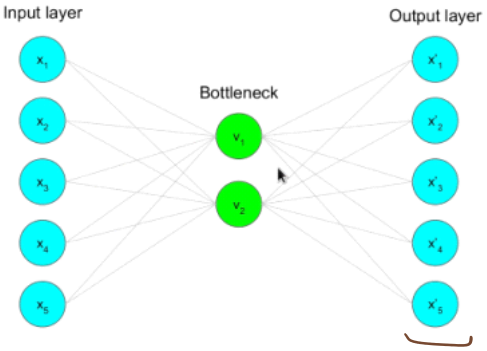
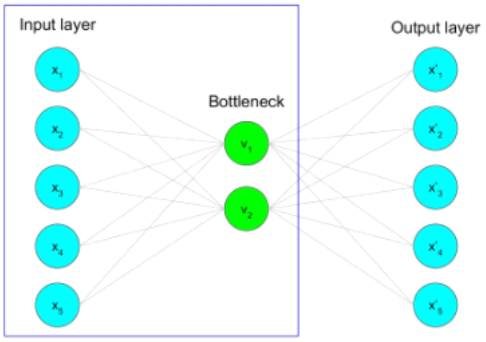
Autoencoders

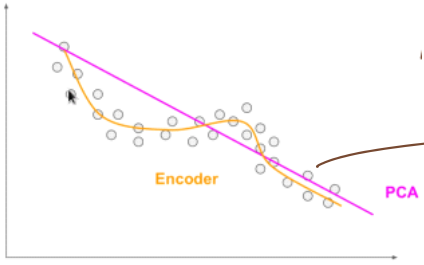
Saturday, October 23, 2021 6:58 AM

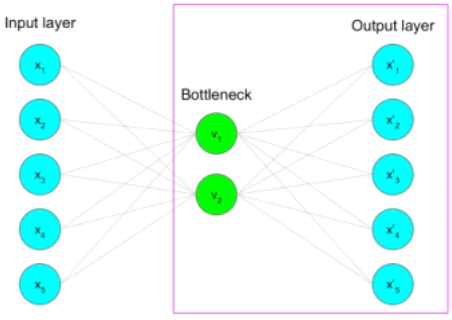


Autoencoder = Encoder + Decoder



Encoder = compress data into lower-dimensional representation (latent space)





Decoder = Decompress representation back to original domain

How can we train an autoencoder?

- Backpropagation
- Minimise reconstruction error

$$E(x, \hat{x})$$

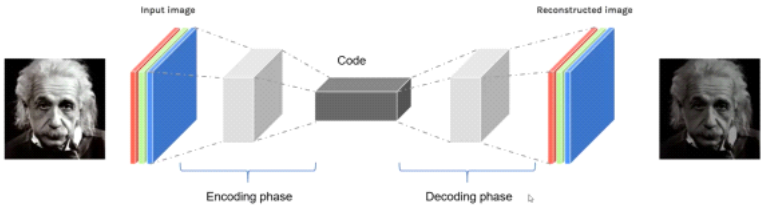
Original data Reconstructed data

What we ask an autoencoder...

- Sensitive enough to input data to reconstruct it
- Insensitive enough to input data **not** to overfit it

$$E(x, \hat{x}) + regularization$$

Autoencoder

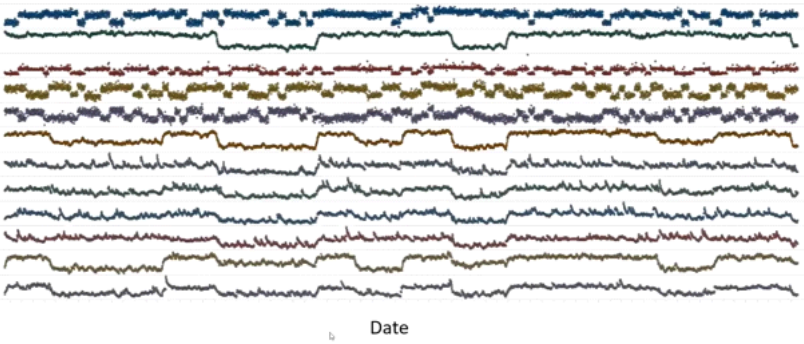



```
model.add(Conv2D(8, (3, 3), activation='relu', padding='same'))
model.add(MaxPooling2D((2, 2), padding='same'))
```

```
model.add(Conv2D(8, (3, 3), activation='relu', padding='same'))
model.add(UpSampling2D((2, 2)))
```

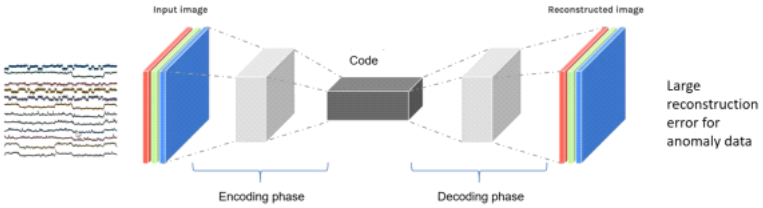
```
model.fit(x, x, epochs=5,shuffle=True)
```

Autoencoder Applications
Anomaly detection



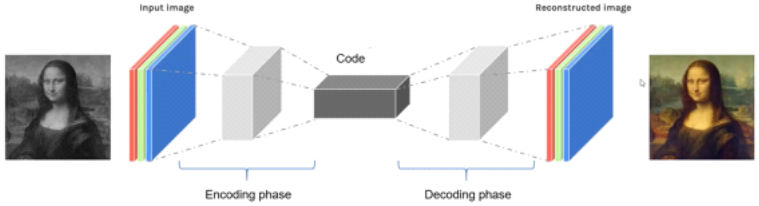
Failure happening somewhere - Identifying the same

Autoencoder Applications
Anomaly detection

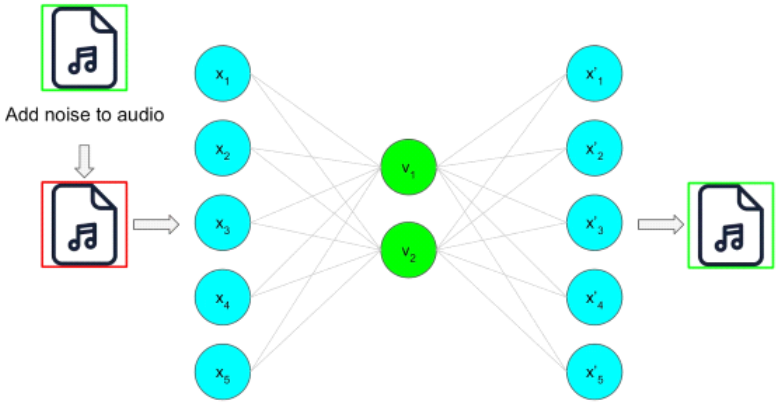


Large reconstruction error for anomaly data

Autoencoder Applications
Image colorization



Denoising with AEs



Measure reconstruction error of output against original audio