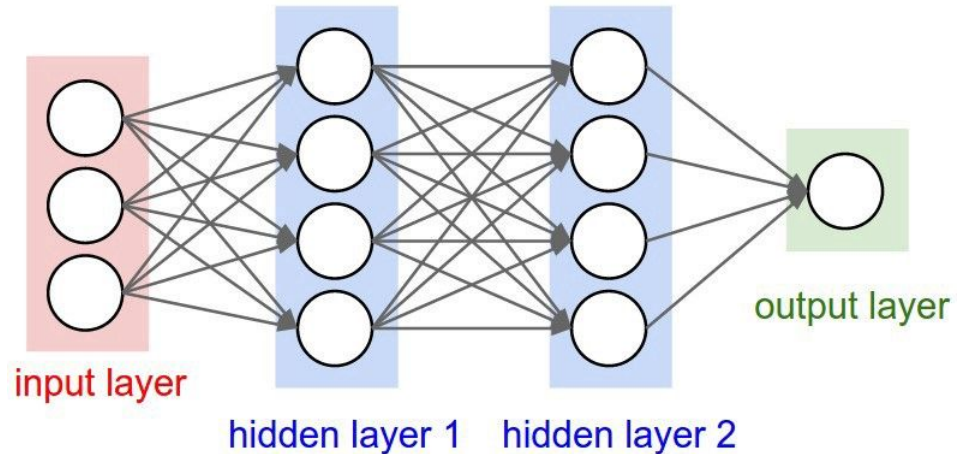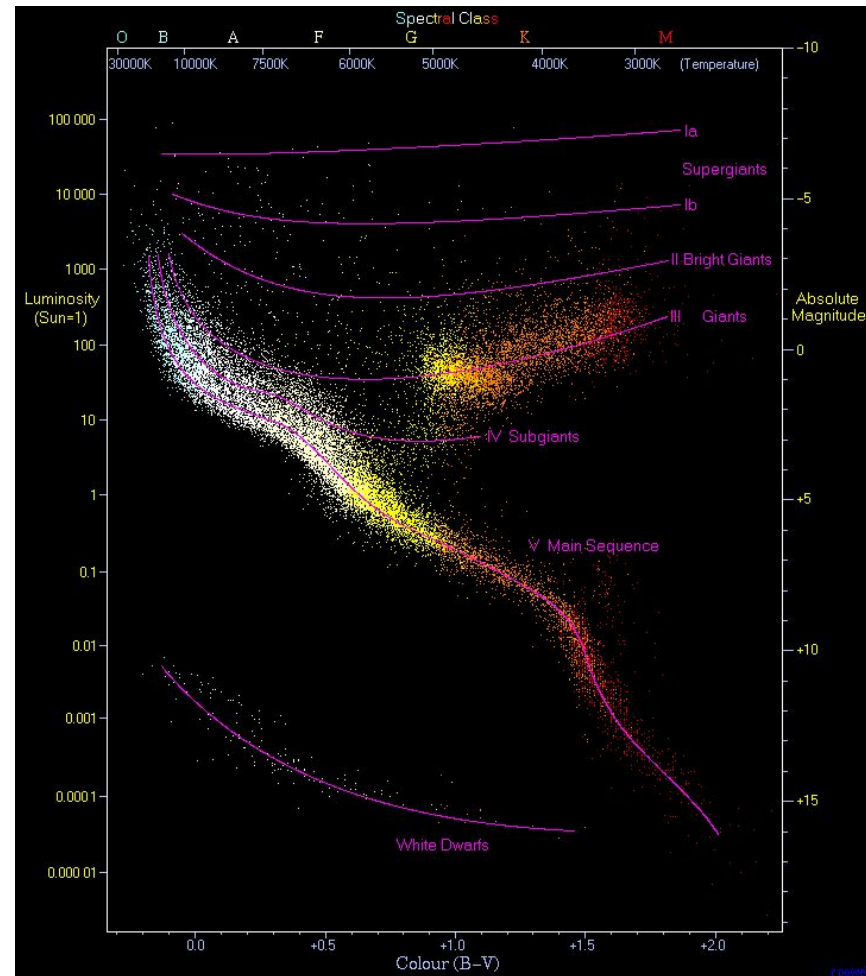# Introduction to Neural Networks with Keras

Adithya Viswanathan

What is a Neural Network?

- Node-based model

- Connected nodes (like our brains)

- Input nodes -> Hidden nodes -> Output nodes

input layer

hidden layer 1   hidden layer 2   output layer

https://www.kaggle.com/deepu1109/star-dataset

Preprocessing the Data

- Remove rows with null values

- Remove unnecessary columns

- Convert non-numerical data to numerical data

- Standardize the data

```
data.replace(["O", "B", "A", "F", "G", "K", "M"],
[1, 2, 3, 4, 5, 6, 7], inplace = True)
```
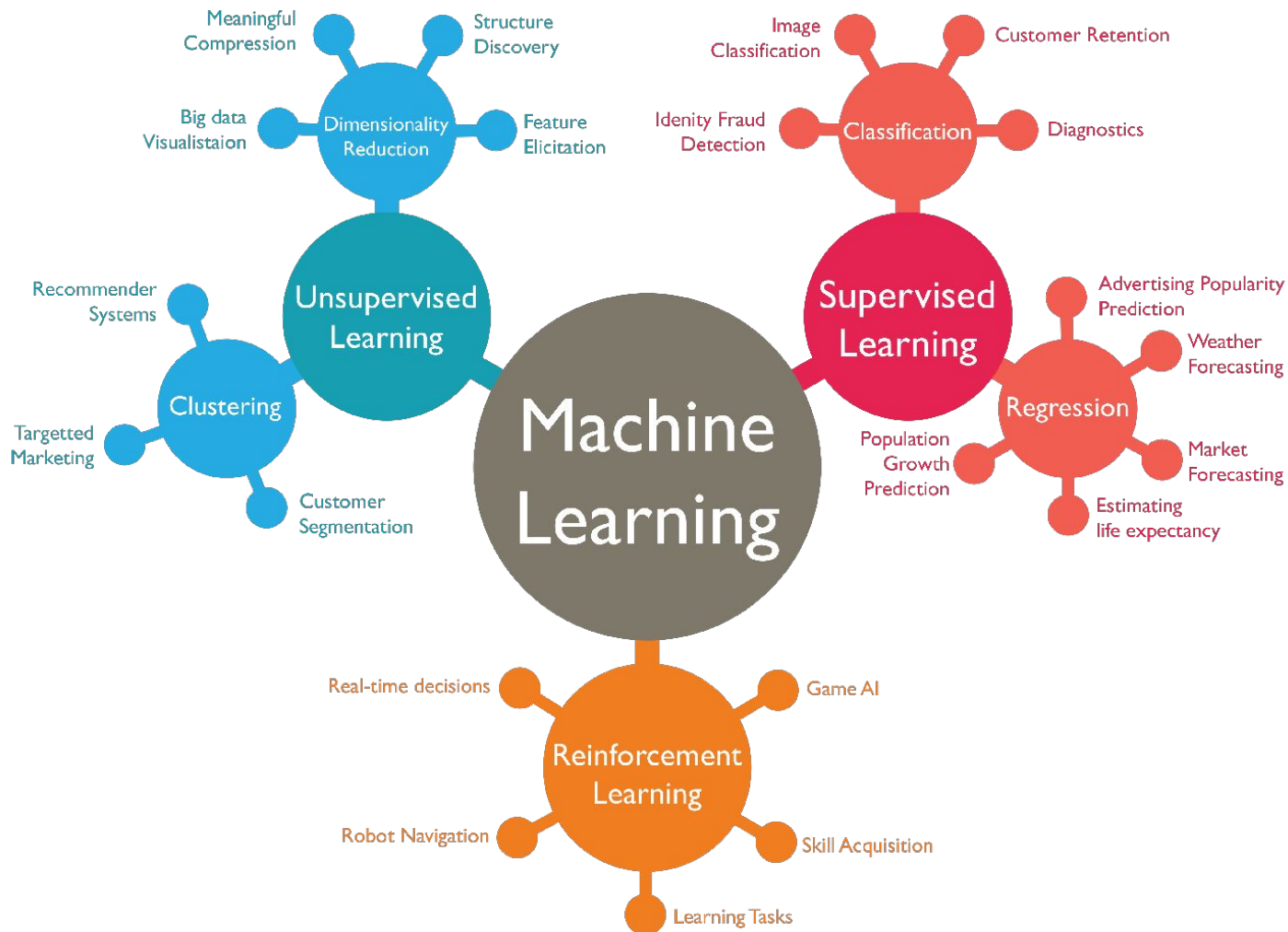
$$z = \frac{x - \mu}{\sigma}$$

- z = Z-Score Standardization

- x = Data points

- μ = Mean (average)

- σ = Standard Deviation

Model Preparation

```python
1  import keras
2  from keras.models import Sequential
3  from keras.layers import Dense
4  # define classification model
5  def classification_model():
6      # create model
7      model = Sequential()
8      model.add(Dense(num_features, activation='relu', input_shape=(6,)))
9      model.add(Dense(128, activation='relu'))
10     model.add(Dense(6, activation='softmax'))
11     # compile model
12     model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
13     return model
```

Training the model

```python
1  # build the model
2  model = classification_model()
3
4  # fit the model
5  model.fit(x_train, y_train, validation_data=(x_test, y_test), epochs=50)
6
7  # evaluate the model
8  scores = model.evaluate(x_test, y_test)
9
10 print('Accuracy: {}% \n Error: {}'.format(scores[1]*100, 1 - scores[1]))
```

Good Resources

Datasets:https://www.kaggle.com

Preprocessing:https://www.analyticsvidhya.com/blog/2016/07/practical-guide-data-preprocessing-python-scikit-learn/

Neural_Nets:https://towardsdatascience.com/a-gentle-introduction-to-neural-networks-series-part-1-2b90b87795bc

https://medium.datadriveninvestor.com/the-basics-of-neural-networks-304364b712dc?gi=a73a5999f43c

Train/Test: https://data-flair.training/blogs/train-test-set-in-python-ml/