```
In [ ]:    # Import our dependencies
           from sklearn.model_selection import train_test_split
           from sklearn.preprocessing import StandardScaler,OneHotEncoder, MinMaxScaler
           import pandas as pd
           import tensorflow as tf
           import numpy as np

           # Import our input dataset
           df = pd.read_csv('../neural-network/pitcher_salaries_cleaned.csv')
           df.head()
```

```
In [ ]:    # create log transformed column for salary
           df['sal-log']=np.log10(df['Salary'])
           df
```

Reduce down to top features

```
In [ ]:    df= df.drop(["Full Name","Team","League","Age","Earned Runs","Home Runs","Wins","Losses","Weight","Height
           df.head()
```

Split Features/Target & Training/Testing Sets

Split into features and target

- **y variable**: Our target variable, `Salary`
- **X variable**: Our features; just drop `Salary` and `Full Name`

```
In [ ]:    # Split our preprocessed data into our features and target arrays
           y = df["sal-log"].values
           X = df.drop(["sal-log"],1).values

           # Split the preprocessed data into a training and testing dataset
           X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=1)
```

Build and Instantiate `StandardScaler` object, then standardize numerical features

```
In [ ]:    # Create a StandardScaler instance
           scaler = MinMaxScaler()

           # Fit the StandardScaler
           X_scaler = scaler.fit(X_train)

           # Scale the data
           X_train_scaled = X_scaler.transform(X_train)
           X_test_scaled = X_scaler.transform(X_test)
```

```
In [ ]:    # see if data scaled properly
           scaled_data=pd.DataFrame(X_train_scaled)
           scaled_data.head()
```

```
In [ ]:    # see if data scaled properly
           scaled_y=pd.DataFrame(y_train_scaled)
           scaled_y.head()
```

Build Neural Net Framework

```python
In [25]:   # Define the model - deep neural net
           number_input_features = len(X_train[0])
           hidden_nodes_layer1 = 50
           hidden_nodes_layer2 = 30
           hidden_nodes_layer3 = 20
           hidden_nodes_layer4 = 15


           nn = tf.keras.models.Sequential()

           # First hidden layer
           nn.add(
               tf.keras.layers.Dense(units=hidden_nodes_layer1, input_dim=number_input_features, activation="relu")
           )

           # Second hidden layer
           nn.add(tf.keras.layers.Dense(units=hidden_nodes_layer2, activation="elu"))

           # Third hidden layer
           nn.add(tf.keras.layers.Dense(units=hidden_nodes_layer3, activation="elu"))

           # Fourth hidden layer
           nn.add(tf.keras.layers.Dense(units=hidden_nodes_layer4, activation="elu"))


           # Output layer
           nn.add(tf.keras.layers.Dense(units=10, activation="relu"))

           # Check the structure of the model
           nn.summary()
```

```
Model: "sequential_4"
_____
 Layer (type)                Output Shape              Param #
=================================================================
 dense_20 (Dense)            (None, 50)                400

 dense_21 (Dense)            (None, 30)                1530

 dense_22 (Dense)            (None, 20)                620

 dense_23 (Dense)            (None, 15)                315

 dense_24 (Dense)            (None, 10)                160

=================================================================
Total params: 3,025
Trainable params: 3,025
Non-trainable params: 0
_____
```

Compile the Model

```python
In [26]:   # Compile the model
           nn.compile(loss="mean_squared_error", optimizer="adam", metrics=["accuracy"])
```

Train the model

```python
In [27]:   # Train the model
```

```
fit_model = nn.fit(X_train,y_train,epochs=200)
```

```
Epoch 1/200
116/116 [==============================] - 1s 2ms/step - loss: 31.0473 - accuracy: 0.0014
Epoch 2/200
116/116 [==============================] - 0s 1ms/step - loss: 18.0313 - accuracy: 0.0019
Epoch 3/200
116/116 [==============================] - 0s 3ms/step - loss: 15.7226 - accuracy: 0.0019
Epoch 4/200
116/116 [==============================] - 0s 2ms/step - loss: 15.2737 - accuracy: 0.0022
Epoch 5/200
116/116 [==============================] - 0s 1ms/step - loss: 15.1771 - accuracy: 0.0032
Epoch 6/200
116/116 [==============================] - 0s 1ms/step - loss: 15.1338 - accuracy: 0.0035
Epoch 7/200
116/116 [==============================] - 0s 943us/step - loss: 15.1422 - accuracy: 0.0035
Epoch 8/200
116/116 [==============================] - 0s 1ms/step - loss: 15.1270 - accuracy: 0.0043
Epoch 9/200
116/116 [==============================] - 0s 2ms/step - loss: 15.1115 - accuracy: 0.0043
Epoch 10/200
116/116 [==============================] - 0s 1ms/step - loss: 15.1396 - accuracy: 0.0030
Epoch 11/200
116/116 [==============================] - 0s 1ms/step - loss: 15.1443 - accuracy: 0.0046
Epoch 12/200
116/116 [==============================] - 0s 1ms/step - loss: 13.7894 - accuracy: 0.0019
Epoch 13/200
116/116 [==============================] - 0s 1ms/step - loss: 11.5753 - accuracy: 0.0032
Epoch 14/200
116/116 [==============================] - 0s 878us/step - loss: 11.5030 - accuracy: 0.0022
Epoch 15/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4426 - accuracy: 0.0027
Epoch 16/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4213 - accuracy: 0.0035
Epoch 17/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4314 - accuracy: 0.0027
Epoch 18/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4197 - accuracy: 0.0038
Epoch 19/200
116/116 [==============================] - 0s 983us/step - loss: 11.4045 - accuracy: 0.0038
Epoch 20/200
116/116 [==============================] - 0s 2ms/step - loss: 11.4427 - accuracy: 0.0030
Epoch 21/200
116/116 [==============================] - 0s 2ms/step - loss: 11.4526 - accuracy: 0.0030
Epoch 22/200
116/116 [==============================] - 0s 2ms/step - loss: 11.4421 - accuracy: 0.0022
Epoch 23/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4279 - accuracy: 0.0035
Epoch 24/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4257 - accuracy: 0.0030
Epoch 25/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4015 - accuracy: 0.0030
Epoch 26/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4288 - accuracy: 0.0032
Epoch 27/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4246 - accuracy: 0.0019
Epoch 28/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4211 - accuracy: 0.0032
Epoch 29/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4020 - accuracy: 0.0032
Epoch 30/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4134 - accuracy: 0.0019
Epoch 31/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4430 - accuracy: 0.0032
Epoch 32/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4024 - accuracy: 0.0030
Epoch 33/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4019 - accuracy: 0.0030
Epoch 34/200
116/116 [==============================] - 0s 1ms/step - loss: 11.4411 - accuracy: 0.0024
Epoch 35/200
116/116 [==============================] - 0s 957us/step - loss: 11.4140 - accuracy: 0.0024
Epoch 36/200
116/116 [==============================] - 0s 2ms/step - loss: 10.2589 - accuracy: 0.0041
Epoch 37/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7941 - accuracy: 0.0032
```

```
Epoch 38/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7624 - accuracy: 0.0035
Epoch 39/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7391 - accuracy: 0.0027
Epoch 40/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7359 - accuracy: 0.0032
Epoch 41/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7400 - accuracy: 0.0041
Epoch 42/200
116/116 [==============================] - 0s 3ms/step - loss: 7.7617 - accuracy: 0.0038
Epoch 43/200
116/116 [==============================] - 0s 3ms/step - loss: 7.7459 - accuracy: 0.0041
Epoch 44/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7503 - accuracy: 0.0030
Epoch 45/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7196 - accuracy: 0.0032
Epoch 46/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7226 - accuracy: 0.0032
Epoch 47/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7428 - accuracy: 0.0046
Epoch 48/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7286 - accuracy: 0.0057
Epoch 49/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7344 - accuracy: 0.0027
Epoch 50/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7316 - accuracy: 0.0046
Epoch 51/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7313 - accuracy: 0.0027
Epoch 52/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7268 - accuracy: 0.0041
Epoch 53/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7364 - accuracy: 0.0024
Epoch 54/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7138 - accuracy: 0.0027
Epoch 55/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7209 - accuracy: 0.0043
Epoch 56/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7314 - accuracy: 0.0019
Epoch 57/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7335 - accuracy: 0.0041
Epoch 58/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7337 - accuracy: 0.0027
Epoch 59/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7233 - accuracy: 0.0038
Epoch 60/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7482 - accuracy: 0.0051
Epoch 61/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7174 - accuracy: 0.0032
Epoch 62/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7313 - accuracy: 0.0041
Epoch 63/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7555 - accuracy: 0.0043
Epoch 64/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7083 - accuracy: 0.0022
Epoch 65/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7166 - accuracy: 0.0041
Epoch 66/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7095 - accuracy: 0.0027
Epoch 67/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7165 - accuracy: 0.0030
Epoch 68/200
116/116 [==============================] - 0s 913us/step - loss: 7.7279 - accuracy: 0.0035
Epoch 69/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7107 - accuracy: 0.0035
Epoch 70/200
116/116 [==============================] - 0s 896us/step - loss: 7.7156 - accuracy: 0.0027
Epoch 71/200
116/116 [==============================] - 0s 826us/step - loss: 7.7196 - accuracy: 0.0051
Epoch 72/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7091 - accuracy: 0.0030
Epoch 73/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7146 - accuracy: 0.0051
Epoch 74/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7124 - accuracy: 0.0046
Epoch 75/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7062 - accuracy: 0.0059
```

```
Epoch 76/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7050 - accuracy: 0.0054
Epoch 77/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7114 - accuracy: 0.0038
Epoch 78/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7077 - accuracy: 0.0022
Epoch 79/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7162 - accuracy: 0.0062
Epoch 80/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7197 - accuracy: 0.0041
Epoch 81/200
116/116 [==============================] - 0s 878us/step - loss: 7.7069 - accuracy: 0.0043
Epoch 82/200
116/116 [==============================] - 0s 948us/step - loss: 7.7164 - accuracy: 0.0062
Epoch 83/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7118 - accuracy: 0.0049
Epoch 84/200
116/116 [==============================] - 0s 930us/step - loss: 7.7015 - accuracy: 0.0043
Epoch 85/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7088 - accuracy: 0.0030
Epoch 86/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7059 - accuracy: 0.0057
Epoch 87/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7033 - accuracy: 0.0057
Epoch 88/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7027 - accuracy: 0.0054
Epoch 89/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7021 - accuracy: 0.0051
Epoch 90/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7008 - accuracy: 0.0041
Epoch 91/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7022 - accuracy: 0.0057
Epoch 92/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7028 - accuracy: 0.0030
Epoch 93/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7002 - accuracy: 0.0038
Epoch 94/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7022 - accuracy: 0.0041
Epoch 95/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7080 - accuracy: 0.0030
Epoch 96/200
116/116 [==============================] - 0s 991us/step - loss: 7.6990 - accuracy: 0.0019
Epoch 97/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7066 - accuracy: 0.0049
Epoch 98/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7078 - accuracy: 0.0041
Epoch 99/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7061 - accuracy: 0.0035
Epoch 100/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7029 - accuracy: 0.0035
Epoch 101/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6979 - accuracy: 0.0049
Epoch 102/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6995 - accuracy: 0.0051
Epoch 103/200
116/116 [==============================] - 0s 948us/step - loss: 7.7014 - accuracy: 0.0038
Epoch 104/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6960 - accuracy: 0.0038
Epoch 105/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6967 - accuracy: 0.0057
Epoch 106/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7001 - accuracy: 0.0038
Epoch 107/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6964 - accuracy: 0.0043
Epoch 108/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7116 - accuracy: 0.0043
Epoch 109/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7027 - accuracy: 0.0030
Epoch 110/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7003 - accuracy: 0.0022
Epoch 111/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7014 - accuracy: 0.0027
Epoch 112/200
116/116 [==============================] - 0s 922us/step - loss: 7.6997 - accuracy: 0.0032
Epoch 113/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6982 - accuracy: 0.0030
```

```
Epoch 114/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7050 - accuracy: 0.0038
Epoch 115/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6982 - accuracy: 0.0038
Epoch 116/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7020 - accuracy: 0.0049
Epoch 117/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7017 - accuracy: 0.0038
Epoch 118/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7015 - accuracy: 0.0043
Epoch 119/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6965 - accuracy: 0.0057
Epoch 120/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6984 - accuracy: 0.0035
Epoch 121/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6926 - accuracy: 0.0043
Epoch 122/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6973 - accuracy: 0.0054
Epoch 123/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6944 - accuracy: 0.0019
Epoch 124/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6988 - accuracy: 0.0035
Epoch 125/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6973 - accuracy: 0.0038
Epoch 126/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7007 - accuracy: 0.0030
Epoch 127/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6950 - accuracy: 0.0030
Epoch 128/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7017 - accuracy: 0.0032
Epoch 129/200
116/116 [==============================] - 0s 939us/step - loss: 7.6950 - accuracy: 0.0035
Epoch 130/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6988 - accuracy: 0.0027
Epoch 131/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6952 - accuracy: 0.0030
Epoch 132/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6976 - accuracy: 0.0032
Epoch 133/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6948 - accuracy: 0.0024
Epoch 134/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6944 - accuracy: 0.0022
Epoch 135/200
116/116 [==============================] - 0s 861us/step - loss: 7.6944 - accuracy: 0.0035
Epoch 136/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6956 - accuracy: 0.0027
Epoch 137/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6962 - accuracy: 0.0043
Epoch 138/200
116/116 [==============================] - 0s 1ms/step - loss: 7.7022 - accuracy: 0.0041
Epoch 139/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6992 - accuracy: 0.0041
Epoch 140/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6972 - accuracy: 0.0041
Epoch 141/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6983 - accuracy: 0.0024
Epoch 142/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6968 - accuracy: 0.0022
Epoch 143/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6945 - accuracy: 0.0019
Epoch 144/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6921 - accuracy: 0.0016
Epoch 145/200
116/116 [==============================] - 0s 1000us/step - loss: 7.7038 - accuracy: 0.0038
Epoch 146/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6961 - accuracy: 0.0035
Epoch 147/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6941 - accuracy: 0.0027
Epoch 148/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6956 - accuracy: 0.0022
Epoch 149/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6935 - accuracy: 0.0041
Epoch 150/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6989 - accuracy: 0.0032
Epoch 151/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6922 - accuracy: 0.0022
```

```
Epoch 152/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6959 - accuracy: 0.0027
Epoch 153/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6956 - accuracy: 0.0022
Epoch 154/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6970 - accuracy: 0.0024
Epoch 155/200
116/116 [==============================] - 0s 2ms/step - loss: 7.7001 - accuracy: 0.0022
Epoch 156/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6961 - accuracy: 0.0038
Epoch 157/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6916 - accuracy: 0.0016
Epoch 158/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6929 - accuracy: 0.0016
Epoch 159/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6926 - accuracy: 0.0019
Epoch 160/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6938 - accuracy: 0.0019
Epoch 161/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6942 - accuracy: 0.0030
Epoch 162/200
116/116 [==============================] - 0s 3ms/step - loss: 7.6952 - accuracy: 0.0035
Epoch 163/200
116/116 [==============================] - 0s 3ms/step - loss: 7.7016 - accuracy: 0.0035
Epoch 164/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6966 - accuracy: 0.0038
Epoch 165/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6946 - accuracy: 0.0030
Epoch 166/200
116/116 [==============================] - 0s 3ms/step - loss: 7.6923 - accuracy: 8.1037e-04
Epoch 167/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6917 - accuracy: 0.0011
Epoch 168/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6995 - accuracy: 0.0030
Epoch 169/200
116/116 [==============================] - 0s 965us/step - loss: 7.6996 - accuracy: 0.0032
Epoch 170/200
116/116 [==============================] - 0s 974us/step - loss: 7.6915 - accuracy: 0.0022
Epoch 171/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6913 - accuracy: 5.4025e-04
Epoch 172/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6946 - accuracy: 0.0014
Epoch 173/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6929 - accuracy: 0.0011
Epoch 174/200
116/116 [==============================] - 0s 3ms/step - loss: 7.6944 - accuracy: 0.0011
Epoch 175/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6978 - accuracy: 0.0041
Epoch 176/200
116/116 [==============================] - 0s 974us/step - loss: 7.6923 - accuracy: 0.0022
Epoch 177/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6922 - accuracy: 0.0019
Epoch 178/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6899 - accuracy: 0.0027
Epoch 179/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6920 - accuracy: 0.0022
Epoch 180/200
116/116 [==============================] - 0s 1000us/step - loss: 7.6925 - accuracy: 0.0019
Epoch 181/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6879 - accuracy: 5.4025e-04
Epoch 182/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6946 - accuracy: 0.0027
Epoch 183/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6900 - accuracy: 0.0016
Epoch 184/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6888 - accuracy: 0.0016
Epoch 185/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6937 - accuracy: 0.0011
Epoch 186/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6893 - accuracy: 0.0019
Epoch 187/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6920 - accuracy: 0.0027
Epoch 188/200
116/116 [==============================] - 0s 2ms/step - loss: 7.6927 - accuracy: 0.0030
Epoch 189/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6908 - accuracy: 0.0024
```

```
Epoch 190/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6967 - accuracy: 0.0022
Epoch 191/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6908 - accuracy: 0.0016
Epoch 192/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6924 - accuracy: 5.4025e-04
Epoch 193/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6924 - accuracy: 0.0022
Epoch 194/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6969 - accuracy: 0.0030
Epoch 195/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6905 - accuracy: 0.0019
Epoch 196/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6936 - accuracy: 0.0019
Epoch 197/200
116/116 [==============================] - 0s 957us/step - loss: 7.6905 - accuracy: 0.0019
Epoch 198/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6895 - accuracy: 0.0035
Epoch 199/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6899 - accuracy: 0.0032
Epoch 200/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6980 - accuracy: 0.0032
```

In [28]:
```python
# Evaluate the model using the test data
model_loss, model_accuracy = nn.evaluate(X_test_scaled,y_test,verbose=2)
print(f"Loss: {model_loss}, Accuracy: {model_accuracy}")
```

```
39/39 - 0s - loss: 8.1195 - accuracy: 0.0000e+00 - 225ms/epoch - 6ms/step
Loss: 8.119531631469727, Accuracy: 0.0
```
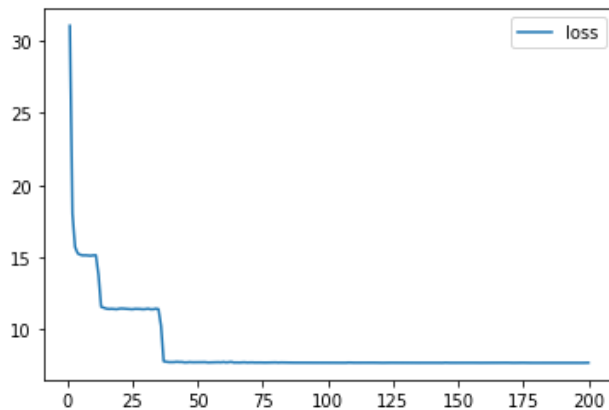
In [29]:
```python
# Create a DataFrame containing training history
history_df = pd.DataFrame(fit_model.history, index=range(1,len(fit_model.history["loss"])+1))

# Plot the Loss
history_df.plot(y="loss")
```
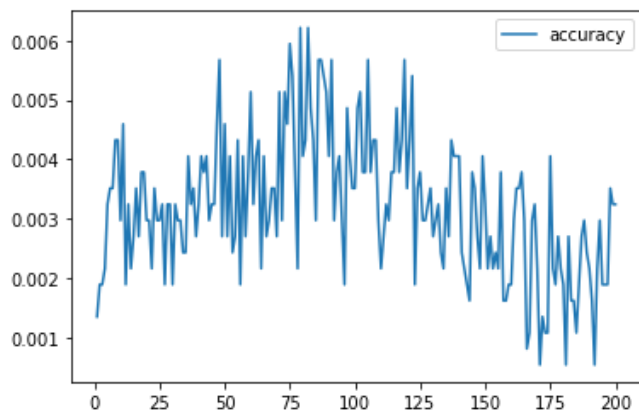
Out[29]: <AxesSubplot:>

In [30]:
```python
# Plot the accuracy
history_df.plot(y="accuracy")
```

Out[30]: <AxesSubplot:>

In [ ]: