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

In [45]:
```
# Define the model - deep neural net
number_input_features = len(X_train[0])
hidden_nodes_layer1 = 40
hidden_nodes_layer2 = 30
hidden_nodes_layer3 = 20


nn = tf.keras.models.Sequential()

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

# 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_layer2, activation="elu"))

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

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

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

```
Model: "sequential_7"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 dense_35 (Dense)            (None, 40)                320

 dense_36 (Dense)            (None, 30)                1230

 dense_37 (Dense)            (None, 30)                930

 dense_38 (Dense)            (None, 30)                930

 dense_39 (Dense)            (None, 10)                310

=================================================================
Total params: 3,720
Trainable params: 3,720
Non-trainable params: 0
_________________________________________________________________
```

Compile the Model

In [46]:
```
# Compile the model
nn.compile(loss="mean_squared_error", optimizer="adam", metrics=["accuracy"])
```

Train the model

In [47]:
```
# Train the model
fit_model = nn.fit(X_train,y_train,epochs=200)
```

```
Epoch 1/200
116/116 [==============================] - 0s 812us/step - loss: 89.3024 - accuracy: 0.0041
```

```
Epoch 2/200
116/116 [==============================] - 0s 922us/step - loss: 34.7485 - accuracy: 5.4025e-04
Epoch 3/200
116/116 [==============================] - 0s 1ms/step - loss: 27.4073 - accuracy: 0.0011
Epoch 4/200
116/116 [==============================] - 0s 1ms/step - loss: 19.1466 - accuracy: 0.0014
Epoch 5/200
116/116 [==============================] - 0s 2ms/step - loss: 18.8484 - accuracy: 0.0014
Epoch 6/200
116/116 [==============================] - 0s 1ms/step - loss: 18.8104 - accuracy: 0.0022
Epoch 7/200
116/116 [==============================] - 0s 852us/step - loss: 18.7229 - accuracy: 0.0035
Epoch 8/200
116/116 [==============================] - 0s 800us/step - loss: 12.8468 - accuracy: 0.0035
Epoch 9/200
116/116 [==============================] - 0s 861us/step - loss: 7.0425 - accuracy: 0.0022
Epoch 10/200
116/116 [==============================] - 0s 800us/step - loss: 6.7282 - accuracy: 0.0041
Epoch 11/200
116/116 [==============================] - 0s 800us/step - loss: 6.6421 - accuracy: 0.0032
Epoch 12/200
116/116 [==============================] - 0s 835us/step - loss: 6.5917 - accuracy: 0.0032
Epoch 13/200
116/116 [==============================] - 0s 809us/step - loss: 6.5462 - accuracy: 0.0030
Epoch 14/200
116/116 [==============================] - 0s 948us/step - loss: 6.5528 - accuracy: 0.0035
Epoch 15/200
116/116 [==============================] - 0s 878us/step - loss: 6.5568 - accuracy: 0.0027
Epoch 16/200
116/116 [==============================] - 0s 826us/step - loss: 6.5538 - accuracy: 0.0027
Epoch 17/200
116/116 [==============================] - 0s 835us/step - loss: 6.5398 - accuracy: 0.0022
Epoch 18/200
116/116 [==============================] - 0s 835us/step - loss: 6.5688 - accuracy: 0.0022
Epoch 19/200
116/116 [==============================] - 0s 983us/step - loss: 6.5710 - accuracy: 0.0030
Epoch 20/200
116/116 [==============================] - 0s 930us/step - loss: 6.5531 - accuracy: 0.0032
Epoch 21/200
116/116 [==============================] - 0s 817us/step - loss: 6.5583 - accuracy: 0.0027
Epoch 22/200
116/116 [==============================] - 0s 948us/step - loss: 6.5420 - accuracy: 0.0022
Epoch 23/200
116/116 [==============================] - 0s 817us/step - loss: 6.5129 - accuracy: 0.0041
Epoch 24/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5600 - accuracy: 0.0019
Epoch 25/200
116/116 [==============================] - 0s 957us/step - loss: 6.5526 - accuracy: 0.0041
Epoch 26/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5451 - accuracy: 0.0027
Epoch 27/200
116/116 [==============================] - 0s 3ms/step - loss: 6.6209 - accuracy: 0.0038
Epoch 28/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5343 - accuracy: 0.0027
Epoch 29/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5277 - accuracy: 0.0022
Epoch 30/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5769 - accuracy: 0.0014
Epoch 31/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5764 - accuracy: 0.0038
Epoch 32/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5123 - accuracy: 0.0022
Epoch 33/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5047 - accuracy: 0.0019
Epoch 34/200
116/116 [==============================] - 0s 870us/step - loss: 6.5119 - accuracy: 0.0027
Epoch 35/200
116/116 [==============================] - 0s 861us/step - loss: 6.5125 - accuracy: 0.0019
Epoch 36/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5595 - accuracy: 0.0027
Epoch 37/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5138 - accuracy: 0.0019
Epoch 38/200
116/116 [==============================] - 0s 965us/step - loss: 6.5263 - accuracy: 0.0022
Epoch 39/200
116/116 [==============================] - 0s 939us/step - loss: 6.5293 - accuracy: 0.0024
```

```
Epoch 40/200
116/116 [==============================] - 0s 800us/step - loss: 6.5456 - accuracy: 0.0030
Epoch 41/200
116/116 [==============================] - 0s 896us/step - loss: 6.5144 - accuracy: 0.0014
Epoch 42/200
116/116 [==============================] - 0s 878us/step - loss: 6.5259 - accuracy: 0.0030
Epoch 43/200
116/116 [==============================] - 0s 878us/step - loss: 6.5153 - accuracy: 0.0027
Epoch 44/200
116/116 [==============================] - 0s 1ms/step - loss: 6.4837 - accuracy: 0.0019
Epoch 45/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5373 - accuracy: 0.0027
Epoch 46/200
116/116 [==============================] - 0s 2ms/step - loss: 6.5055 - accuracy: 0.0022
Epoch 47/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5135 - accuracy: 0.0011
Epoch 48/200
116/116 [==============================] - 0s 904us/step - loss: 6.5463 - accuracy: 0.0022
Epoch 49/200
116/116 [==============================] - 0s 817us/step - loss: 6.5086 - accuracy: 0.0014
Epoch 50/200
116/116 [==============================] - 0s 1ms/step - loss: 6.5330 - accuracy: 0.0032
Epoch 51/200
116/116 [==============================] - 0s 861us/step - loss: 6.5001 - accuracy: 0.0022
Epoch 52/200
116/116 [==============================] - 0s 896us/step - loss: 6.5015 - accuracy: 0.0014
Epoch 53/200
116/116 [==============================] - 0s 861us/step - loss: 6.4923 - accuracy: 0.0014
Epoch 54/200
116/116 [==============================] - 0s 1ms/step - loss: 3.0818 - accuracy: 0.0024
Epoch 55/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4195 - accuracy: 0.0030
Epoch 56/200
116/116 [==============================] - 0s 843us/step - loss: 0.4056 - accuracy: 0.0019
Epoch 57/200
116/116 [==============================] - 0s 817us/step - loss: 0.3984 - accuracy: 0.0019
Epoch 58/200
116/116 [==============================] - 0s 843us/step - loss: 0.4004 - accuracy: 0.0019
Epoch 59/200
116/116 [==============================] - 0s 887us/step - loss: 0.4024 - accuracy: 0.0019
Epoch 60/200
116/116 [==============================] - 0s 861us/step - loss: 0.3902 - accuracy: 0.0016
Epoch 61/200
116/116 [==============================] - 0s 843us/step - loss: 0.3799 - accuracy: 0.0016
Epoch 62/200
116/116 [==============================] - 0s 887us/step - loss: 0.3784 - accuracy: 0.0019
Epoch 63/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3839 - accuracy: 0.0014
Epoch 64/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3738 - accuracy: 8.1037e-04
Epoch 65/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3842 - accuracy: 0.0030
Epoch 66/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3836 - accuracy: 0.0016
Epoch 67/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3674 - accuracy: 0.0014
Epoch 68/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3709 - accuracy: 0.0019
Epoch 69/200
116/116 [==============================] - 0s 904us/step - loss: 0.3676 - accuracy: 0.0016
Epoch 70/200
116/116 [==============================] - 0s 817us/step - loss: 0.3756 - accuracy: 0.0016
Epoch 71/200
116/116 [==============================] - 0s 983us/step - loss: 0.3702 - accuracy: 0.0019
Epoch 72/200
116/116 [==============================] - 0s 896us/step - loss: 0.3737 - accuracy: 5.4025e-04
Epoch 73/200
116/116 [==============================] - 0s 843us/step - loss: 0.3729 - accuracy: 0.0014
Epoch 74/200
116/116 [==============================] - 0s 930us/step - loss: 0.3841 - accuracy: 8.1037e-04
Epoch 75/200
116/116 [==============================] - 0s 939us/step - loss: 0.3757 - accuracy: 0.0016
Epoch 76/200
116/116 [==============================] - 0s 913us/step - loss: 0.3700 - accuracy: 0.0019
Epoch 77/200
116/116 [==============================] - 0s 852us/step - loss: 0.3778 - accuracy: 0.0014
```

```
Epoch 78/200
116/116 [==============================] - 0s 913us/step - loss: 0.3674 - accuracy: 0.0016
Epoch 79/200
116/116 [==============================] - 0s 870us/step - loss: 0.3761 - accuracy: 0.0022
Epoch 80/200
116/116 [==============================] - 0s 904us/step - loss: 0.3766 - accuracy: 5.4025e-04
Epoch 81/200
116/116 [==============================] - 0s 870us/step - loss: 0.3597 - accuracy: 0.0027
Epoch 82/200
116/116 [==============================] - 0s 870us/step - loss: 0.3665 - accuracy: 0.0019
Epoch 83/200
116/116 [==============================] - 0s 835us/step - loss: 0.3746 - accuracy: 0.0022
Epoch 84/200
116/116 [==============================] - 0s 817us/step - loss: 0.3854 - accuracy: 0.0016
Epoch 85/200
116/116 [==============================] - 0s 966us/step - loss: 0.3666 - accuracy: 0.0030
Epoch 86/200
116/116 [==============================] - 0s 826us/step - loss: 0.3609 - accuracy: 0.0038
Epoch 87/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3617 - accuracy: 0.0024
Epoch 88/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3656 - accuracy: 0.0011
Epoch 89/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3673 - accuracy: 0.0027
Epoch 90/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3652 - accuracy: 0.0022
Epoch 91/200
116/116 [==============================] - 0s 861us/step - loss: 0.3665 - accuracy: 0.0022
Epoch 92/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3706 - accuracy: 5.4025e-04
Epoch 93/200
116/116 [==============================] - 0s 843us/step - loss: 0.3666 - accuracy: 0.0011
Epoch 94/200
116/116 [==============================] - 0s 965us/step - loss: 0.3690 - accuracy: 0.0014
Epoch 95/200
116/116 [==============================] - 0s 913us/step - loss: 0.3700 - accuracy: 0.0027
Epoch 96/200
116/116 [==============================] - 0s 843us/step - loss: 0.3592 - accuracy: 0.0022
Epoch 97/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3627 - accuracy: 0.0022
Epoch 98/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3586 - accuracy: 0.0024
Epoch 99/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3516 - accuracy: 0.0027
Epoch 100/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3630 - accuracy: 0.0016
Epoch 101/200
116/116 [==============================] - 0s 974us/step - loss: 0.3565 - accuracy: 0.0022
Epoch 102/200
116/116 [==============================] - 0s 939us/step - loss: 0.3705 - accuracy: 0.0030
Epoch 103/200
116/116 [==============================] - 0s 922us/step - loss: 0.3682 - accuracy: 0.0022
Epoch 104/200
116/116 [==============================] - 0s 922us/step - loss: 0.3538 - accuracy: 0.0019
Epoch 105/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3650 - accuracy: 0.0019
Epoch 106/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3626 - accuracy: 0.0014
Epoch 107/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3508 - accuracy: 0.0024
Epoch 108/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3610 - accuracy: 0.0035
Epoch 109/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3585 - accuracy: 0.0022
Epoch 110/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3541 - accuracy: 0.0030
Epoch 111/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3548 - accuracy: 0.0027
Epoch 112/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3552 - accuracy: 0.0014
Epoch 113/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3641 - accuracy: 0.0016
Epoch 114/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3557 - accuracy: 0.0024
Epoch 115/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3560 - accuracy: 0.0027
```

```
Epoch 116/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3573 - accuracy: 0.0035
Epoch 117/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3617 - accuracy: 0.0022
Epoch 118/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3534 - accuracy: 0.0032
Epoch 119/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3595 - accuracy: 0.0016
Epoch 120/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3587 - accuracy: 0.0011
Epoch 121/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3500 - accuracy: 0.0024
Epoch 122/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3596 - accuracy: 0.0035
Epoch 123/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3548 - accuracy: 0.0035
Epoch 124/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3557 - accuracy: 0.0024
Epoch 125/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3517 - accuracy: 0.0038
Epoch 126/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3566 - accuracy: 0.0019
Epoch 127/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3530 - accuracy: 0.0022
Epoch 128/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3548 - accuracy: 0.0019
Epoch 129/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3615 - accuracy: 0.0019
Epoch 130/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3505 - accuracy: 0.0027
Epoch 131/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3548 - accuracy: 0.0027
Epoch 132/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3557 - accuracy: 0.0014
Epoch 133/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3499 - accuracy: 0.0027
Epoch 134/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3499 - accuracy: 0.0019
Epoch 135/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3523 - accuracy: 0.0019
Epoch 136/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3552 - accuracy: 0.0030
Epoch 137/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3483 - accuracy: 0.0022
Epoch 138/200
116/116 [==============================] - 0s 809us/step - loss: 0.3577 - accuracy: 0.0019
Epoch 139/200
116/116 [==============================] - 0s 861us/step - loss: 0.3537 - accuracy: 0.0019
Epoch 140/200
116/116 [==============================] - 0s 913us/step - loss: 0.3540 - accuracy: 0.0035
Epoch 141/200
116/116 [==============================] - 0s 861us/step - loss: 0.3573 - accuracy: 0.0019
Epoch 142/200
116/116 [==============================] - 0s 974us/step - loss: 0.3563 - accuracy: 0.0019
Epoch 143/200
116/116 [==============================] - 0s 870us/step - loss: 0.3524 - accuracy: 0.0016
Epoch 144/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3663 - accuracy: 0.0027
Epoch 145/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3491 - accuracy: 5.4025e-04
Epoch 146/200
116/116 [==============================] - 0s 904us/step - loss: 0.3510 - accuracy: 0.0014
Epoch 147/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3513 - accuracy: 0.0019
Epoch 148/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3481 - accuracy: 0.0016
Epoch 149/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3471 - accuracy: 0.0024
Epoch 150/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3488 - accuracy: 0.0011
Epoch 151/200
116/116 [==============================] - 0s 930us/step - loss: 0.3515 - accuracy: 0.0019
Epoch 152/200
116/116 [==============================] - 0s 841us/step - loss: 0.3494 - accuracy: 5.4025e-04
Epoch 153/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3490 - accuracy: 0.0027
```

```
Epoch 154/200
116/116 [==============================] - 0s 843us/step - loss: 0.3464 - accuracy: 0.0030
Epoch 155/200
116/116 [==============================] - 0s 817us/step - loss: 0.3501 - accuracy: 0.0030
Epoch 156/200
116/116 [==============================] - 0s 922us/step - loss: 0.3502 - accuracy: 0.0014
Epoch 157/200
116/116 [==============================] - 0s 904us/step - loss: 0.3490 - accuracy: 0.0027
Epoch 158/200
116/116 [==============================] - 0s 930us/step - loss: 0.3527 - accuracy: 0.0024
Epoch 159/200
116/116 [==============================] - 0s 809us/step - loss: 0.3579 - accuracy: 0.0030
Epoch 160/200
116/116 [==============================] - 0s 974us/step - loss: 0.3502 - accuracy: 0.0032
Epoch 161/200
116/116 [==============================] - 0s 835us/step - loss: 0.3522 - accuracy: 0.0019
Epoch 162/200
116/116 [==============================] - 0s 861us/step - loss: 0.3501 - accuracy: 0.0027
Epoch 163/200
116/116 [==============================] - 0s 991us/step - loss: 0.3500 - accuracy: 0.0035
Epoch 164/200
116/116 [==============================] - 0s 852us/step - loss: 0.3547 - accuracy: 0.0027
Epoch 165/200
116/116 [==============================] - 0s 904us/step - loss: 0.3606 - accuracy: 0.0016
Epoch 166/200
116/116 [==============================] - 0s 974us/step - loss: 0.3477 - accuracy: 0.0027
Epoch 167/200
116/116 [==============================] - 0s 957us/step - loss: 0.3474 - accuracy: 0.0022
Epoch 168/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3574 - accuracy: 0.0043
Epoch 169/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3484 - accuracy: 0.0041
Epoch 170/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3584 - accuracy: 0.0027
Epoch 171/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3498 - accuracy: 0.0035
Epoch 172/200
116/116 [==============================] - 0s 904us/step - loss: 0.3520 - accuracy: 0.0030
Epoch 173/200
116/116 [==============================] - 0s 817us/step - loss: 0.3452 - accuracy: 0.0046
Epoch 174/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3503 - accuracy: 0.0041
Epoch 175/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3478 - accuracy: 0.0035
Epoch 176/200
116/116 [==============================] - 0s 922us/step - loss: 0.3499 - accuracy: 0.0032
Epoch 177/200
116/116 [==============================] - 0s 870us/step - loss: 0.3499 - accuracy: 0.0030
Epoch 178/200
116/116 [==============================] - 0s 843us/step - loss: 0.3446 - accuracy: 0.0030
Epoch 179/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3470 - accuracy: 0.0027
Epoch 180/200
116/116 [==============================] - 0s 843us/step - loss: 0.3472 - accuracy: 0.0032
Epoch 181/200
116/116 [==============================] - 0s 835us/step - loss: 0.3480 - accuracy: 0.0046
Epoch 182/200
116/116 [==============================] - 0s 843us/step - loss: 0.3471 - accuracy: 0.0019
Epoch 183/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3462 - accuracy: 0.0032
Epoch 184/200
116/116 [==============================] - 0s 904us/step - loss: 0.3519 - accuracy: 0.0027
Epoch 185/200
116/116 [==============================] - 0s 800us/step - loss: 0.3466 - accuracy: 0.0027
Epoch 186/200
116/116 [==============================] - 0s 878us/step - loss: 0.3524 - accuracy: 0.0051
Epoch 187/200
116/116 [==============================] - 0s 913us/step - loss: 0.3480 - accuracy: 0.0049
Epoch 188/200
116/116 [==============================] - 0s 835us/step - loss: 0.3462 - accuracy: 0.0046
Epoch 189/200
116/116 [==============================] - 0s 835us/step - loss: 0.3445 - accuracy: 0.0038
Epoch 190/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3475 - accuracy: 0.0035
Epoch 191/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3472 - accuracy: 0.0046
```

```
Epoch 192/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3535 - accuracy: 0.0046
Epoch 193/200
116/116 [==============================] - 0s 817us/step - loss: 0.3487 - accuracy: 0.0030
Epoch 194/200
116/116 [==============================] - 0s 844us/step - loss: 0.3460 - accuracy: 0.0022
Epoch 195/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3447 - accuracy: 0.0030
Epoch 196/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3513 - accuracy: 0.0035
Epoch 197/200
116/116 [==============================] - 0s 904us/step - loss: 0.3477 - accuracy: 0.0035
Epoch 198/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3515 - accuracy: 0.0041
Epoch 199/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3476 - accuracy: 0.0035
Epoch 200/200
116/116 [==============================] - 0s 896us/step - loss: 0.3466 - accuracy: 0.0032
```

In [48]:

```
# 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}")
```

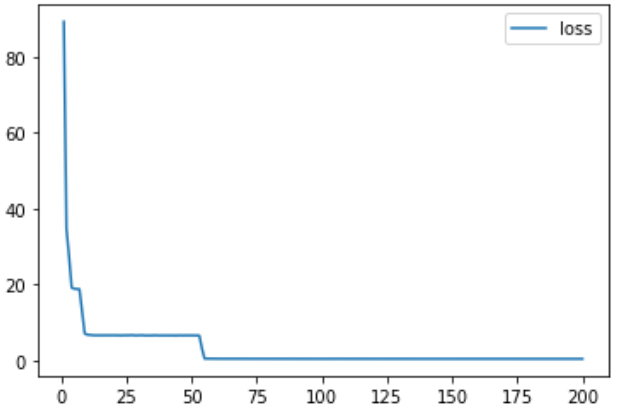
```
39/39 - 0s - loss: 3.5081 - accuracy: 0.0057 - 103ms/epoch - 3ms/step
Loss: 3.5080618858337402, Accuracy: 0.005668016150593758
```

In [49]:

```
# 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")
```

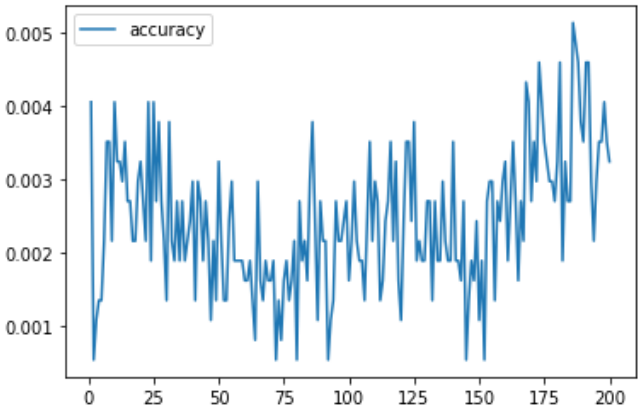
Out[49]: <AxesSubplot:>



In [50]:

```
# Plot the accuracy
history_df.plot(y="accuracy")
```

Out[50]: <AxesSubplot:>


accuracy
0.005
0.004
0.003
0.002
0.001
0
25
50
75
100
125
150
175
200

In [ ]: