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 [31]:
```
# 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="selu")
)

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

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

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



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

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

```
Model: "sequential_5"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 dense_25 (Dense)            (None, 50)                400

 dense_26 (Dense)            (None, 30)                1530

 dense_27 (Dense)            (None, 20)                620

 dense_28 (Dense)            (None, 15)                315

 dense_29 (Dense)            (None, 10)                160

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

Compile the Model

In [32]:
```
# Compile the model
nn.compile(loss="mean_squared_error", optimizer="adam", metrics=["accuracy"])
```

Train the model

In [33]:
```
# Train the model
```

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

```
Epoch 1/200
116/116 [==============================] - 1s 1ms/step - loss: 59.7091 - accuracy: 0.0016
Epoch 2/200
116/116 [==============================] - 0s 1ms/step - loss: 7.6197 - accuracy: 8.1037e-04
Epoch 3/200
116/116 [==============================] - 0s 1ms/step - loss: 2.1364 - accuracy: 0.0024
Epoch 4/200
116/116 [==============================] - 0s 1ms/step - loss: 0.5557 - accuracy: 0.0035
Epoch 5/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4598 - accuracy: 0.0030
Epoch 6/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4441 - accuracy: 0.0024
Epoch 7/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4404 - accuracy: 0.0014
Epoch 8/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4448 - accuracy: 0.0032
Epoch 9/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3999 - accuracy: 0.0019
Epoch 10/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4468 - accuracy: 0.0030
Epoch 11/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4430 - accuracy: 0.0035
Epoch 12/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4101 - accuracy: 0.0027
Epoch 13/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4230 - accuracy: 0.0041
Epoch 14/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4375 - accuracy: 0.0014
Epoch 15/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4316 - accuracy: 0.0024
Epoch 16/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4397 - accuracy: 0.0041
Epoch 17/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4121 - accuracy: 0.0027
Epoch 18/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4044 - accuracy: 0.0016
Epoch 19/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4300 - accuracy: 0.0019
Epoch 20/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4342 - accuracy: 0.0024
Epoch 21/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4349 - accuracy: 0.0027
Epoch 22/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3992 - accuracy: 0.0014
Epoch 23/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4414 - accuracy: 0.0022
Epoch 24/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4199 - accuracy: 2.7012e-04
Epoch 25/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4428 - accuracy: 2.7012e-04
Epoch 26/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4221 - accuracy: 0.0014
Epoch 27/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4239 - accuracy: 0.0014
Epoch 28/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4766 - accuracy: 0.0014
Epoch 29/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4253 - accuracy: 0.0014
Epoch 30/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4101 - accuracy: 0.0011
Epoch 31/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4113 - accuracy: 5.4025e-04
Epoch 32/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4071 - accuracy: 0.0014
Epoch 33/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3973 - accuracy: 5.4025e-04
Epoch 34/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4020 - accuracy: 8.1037e-04
Epoch 35/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3862 - accuracy: 8.1037e-04
Epoch 36/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4000 - accuracy: 5.4025e-04
Epoch 37/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4175 - accuracy: 5.4025e-04
```

```
Epoch 38/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3866 - accuracy: 8.1037e-04
Epoch 39/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4215 - accuracy: 0.0016
Epoch 40/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4511 - accuracy: 0.0011
Epoch 41/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3796 - accuracy: 5.4025e-04
Epoch 42/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3705 - accuracy: 0.0014
Epoch 43/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3996 - accuracy: 0.0014
Epoch 44/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3955 - accuracy: 2.7012e-04
Epoch 45/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4084 - accuracy: 0.0000e+00
Epoch 46/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3989 - accuracy: 0.0011
Epoch 47/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4270 - accuracy: 5.4025e-04
Epoch 48/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4062 - accuracy: 0.0014
Epoch 49/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4106 - accuracy: 2.7012e-04
Epoch 50/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3877 - accuracy: 8.1037e-04
Epoch 51/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4232 - accuracy: 8.1037e-04
Epoch 52/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3860 - accuracy: 0.0000e+00
Epoch 53/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4033 - accuracy: 0.0000e+00
Epoch 54/200
116/116 [==============================] - 0s 2ms/step - loss: 0.4031 - accuracy: 2.7012e-04
Epoch 55/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3812 - accuracy: 5.4025e-04
Epoch 56/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3915 - accuracy: 8.1037e-04
Epoch 57/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3896 - accuracy: 0.0014
Epoch 58/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3701 - accuracy: 5.4025e-04
Epoch 59/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3996 - accuracy: 0.0014
Epoch 60/200
116/116 [==============================] - 0s 1ms/step - loss: 0.4206 - accuracy: 0.0000e+00
Epoch 61/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3792 - accuracy: 0.0011
Epoch 62/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3789 - accuracy: 0.0011
Epoch 63/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3897 - accuracy: 0.0011
Epoch 64/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3737 - accuracy: 2.7012e-04
Epoch 65/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3685 - accuracy: 8.1037e-04
Epoch 66/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3866 - accuracy: 8.1037e-04
Epoch 67/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3804 - accuracy: 2.7012e-04
Epoch 68/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3893 - accuracy: 8.1037e-04
Epoch 69/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3776 - accuracy: 0.0011
Epoch 70/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3733 - accuracy: 0.0011
Epoch 71/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3754 - accuracy: 2.7012e-04
Epoch 72/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3824 - accuracy: 8.1037e-04
Epoch 73/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3687 - accuracy: 0.0014
Epoch 74/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3715 - accuracy: 0.0016
Epoch 75/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3772 - accuracy: 0.0016
```

```
Epoch 76/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3823 - accuracy: 0.0019
Epoch 77/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3673 - accuracy: 0.0011
Epoch 78/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3871 - accuracy: 0.0024
Epoch 79/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3797 - accuracy: 0.0016
Epoch 80/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3779 - accuracy: 0.0024
Epoch 81/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3631 - accuracy: 0.0016
Epoch 82/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3642 - accuracy: 0.0014
Epoch 83/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3751 - accuracy: 0.0022
Epoch 84/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3613 - accuracy: 0.0024
Epoch 85/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3658 - accuracy: 0.0024
Epoch 86/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3657 - accuracy: 0.0027
Epoch 87/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3710 - accuracy: 0.0014
Epoch 88/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3677 - accuracy: 0.0019
Epoch 89/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3694 - accuracy: 0.0011
Epoch 90/200
116/116 [==============================] - 0s 3ms/step - loss: 0.3691 - accuracy: 0.0019
Epoch 91/200
116/116 [==============================] - 0s 3ms/step - loss: 0.3713 - accuracy: 0.0027
Epoch 92/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3576 - accuracy: 0.0016
Epoch 93/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3640 - accuracy: 0.0022
Epoch 94/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3634 - accuracy: 0.0038
Epoch 95/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3758 - accuracy: 0.0011
Epoch 96/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3751 - accuracy: 0.0030
Epoch 97/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3589 - accuracy: 0.0027
Epoch 98/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3606 - accuracy: 0.0035
Epoch 99/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3565 - accuracy: 0.0019
Epoch 100/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3622 - accuracy: 0.0032
Epoch 101/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3654 - accuracy: 0.0041
Epoch 102/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3541 - accuracy: 0.0041
Epoch 103/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3539 - accuracy: 0.0030
Epoch 104/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3550 - accuracy: 0.0027
Epoch 105/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3579 - accuracy: 0.0016
Epoch 106/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3530 - accuracy: 0.0024
Epoch 107/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3562 - accuracy: 0.0041
Epoch 108/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3548 - accuracy: 0.0032
Epoch 109/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3592 - accuracy: 0.0027
Epoch 110/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3570 - accuracy: 0.0041
Epoch 111/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3539 - accuracy: 0.0030
Epoch 112/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3568 - accuracy: 0.0043
Epoch 113/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3584 - accuracy: 0.0032
```

```
Epoch 114/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3571 - accuracy: 0.0019
Epoch 115/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3701 - accuracy: 0.0032
Epoch 116/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3508 - accuracy: 0.0038
Epoch 117/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3557 - accuracy: 0.0019
Epoch 118/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3494 - accuracy: 0.0024
Epoch 119/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3549 - accuracy: 0.0030
Epoch 120/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3483 - accuracy: 0.0024
Epoch 121/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3551 - accuracy: 0.0022
Epoch 122/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3636 - accuracy: 0.0035
Epoch 123/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3525 - accuracy: 0.0024
Epoch 124/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3490 - accuracy: 0.0022
Epoch 125/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3558 - accuracy: 0.0022
Epoch 126/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3498 - accuracy: 0.0035
Epoch 127/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3499 - accuracy: 0.0030
Epoch 128/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3503 - accuracy: 0.0030
Epoch 129/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3569 - accuracy: 0.0032
Epoch 130/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3548 - accuracy: 0.0035
Epoch 131/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3525 - accuracy: 0.0027
Epoch 132/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3568 - accuracy: 0.0038
Epoch 133/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3498 - accuracy: 0.0027
Epoch 134/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3489 - accuracy: 0.0027
Epoch 135/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3567 - accuracy: 0.0019
Epoch 136/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3528 - accuracy: 0.0032
Epoch 137/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3531 - accuracy: 0.0027
Epoch 138/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3531 - accuracy: 0.0038
Epoch 139/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3481 - accuracy: 0.0032
Epoch 140/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3489 - accuracy: 0.0024
Epoch 141/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3517 - accuracy: 0.0019
Epoch 142/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3540 - accuracy: 0.0030
Epoch 143/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3690 - accuracy: 0.0022
Epoch 144/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3572 - accuracy: 0.0035
Epoch 145/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3465 - accuracy: 0.0032
Epoch 146/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3592 - accuracy: 0.0027
Epoch 147/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3557 - accuracy: 0.0022
Epoch 148/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3513 - accuracy: 0.0027
Epoch 149/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3530 - accuracy: 0.0019
Epoch 150/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3443 - accuracy: 0.0024
Epoch 151/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3513 - accuracy: 0.0022
```

```
Epoch 152/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3512 - accuracy: 0.0038
Epoch 153/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3540 - accuracy: 0.0032
Epoch 154/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3577 - accuracy: 0.0016
Epoch 155/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3498 - accuracy: 0.0032
Epoch 156/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3472 - accuracy: 0.0014
Epoch 157/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3474 - accuracy: 0.0035
Epoch 158/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3491 - accuracy: 0.0019
Epoch 159/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3510 - accuracy: 0.0019
Epoch 160/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3511 - accuracy: 0.0019
Epoch 161/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3474 - accuracy: 0.0035
Epoch 162/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3463 - accuracy: 0.0032
Epoch 163/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3513 - accuracy: 0.0024
Epoch 164/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3475 - accuracy: 0.0019
Epoch 165/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3499 - accuracy: 0.0027
Epoch 166/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3456 - accuracy: 0.0032
Epoch 167/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3519 - accuracy: 0.0030
Epoch 168/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3485 - accuracy: 0.0030
Epoch 169/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3460 - accuracy: 0.0019
Epoch 170/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3479 - accuracy: 0.0030
Epoch 171/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3460 - accuracy: 0.0022
Epoch 172/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3551 - accuracy: 0.0032
Epoch 173/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3492 - accuracy: 0.0022
Epoch 174/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3464 - accuracy: 0.0022
Epoch 175/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3471 - accuracy: 0.0016
Epoch 176/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3454 - accuracy: 0.0022
Epoch 177/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3461 - accuracy: 0.0022
Epoch 178/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3451 - accuracy: 0.0030
Epoch 179/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3453 - accuracy: 0.0014
Epoch 180/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3429 - accuracy: 0.0032
Epoch 181/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3516 - accuracy: 0.0022
Epoch 182/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3453 - accuracy: 0.0016
Epoch 183/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3446 - accuracy: 0.0027
Epoch 184/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3493 - accuracy: 0.0022
Epoch 185/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3439 - accuracy: 0.0022
Epoch 186/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3404 - accuracy: 0.0027
Epoch 187/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3456 - accuracy: 0.0024
Epoch 188/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3460 - accuracy: 0.0014
Epoch 189/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3460 - accuracy: 0.0014
```

```
Epoch 190/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3497 - accuracy: 0.0022
Epoch 191/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3496 - accuracy: 0.0014
Epoch 192/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3419 - accuracy: 0.0014
Epoch 193/200
116/116 [==============================] - 0s 2ms/step - loss: 0.3421 - accuracy: 0.0024
Epoch 194/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3400 - accuracy: 0.0019
Epoch 195/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3443 - accuracy: 0.0022
Epoch 196/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3476 - accuracy: 0.0014
Epoch 197/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3430 - accuracy: 0.0019
Epoch 198/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3412 - accuracy: 0.0011
Epoch 199/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3467 - accuracy: 0.0024
Epoch 200/200
116/116 [==============================] - 0s 1ms/step - loss: 0.3426 - accuracy: 0.0043
```

In [34]:

```
# 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}")
```

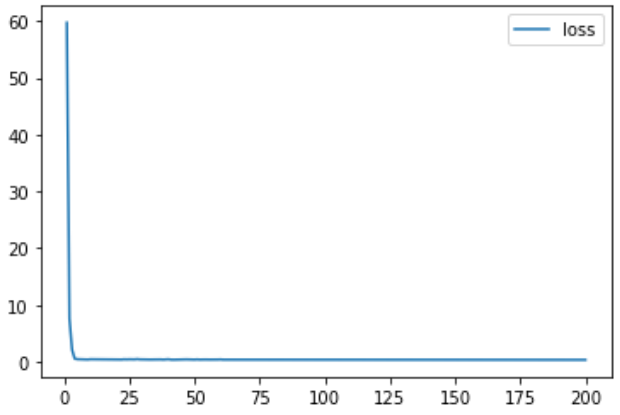
```
39/39 - 0s - loss: 14.3269 - accuracy: 8.0972e-04 - 143ms/epoch - 4ms/step
Loss: 14.326885223388672, Accuracy: 0.0008097165846265852
```

In [35]:

```
# 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")
```

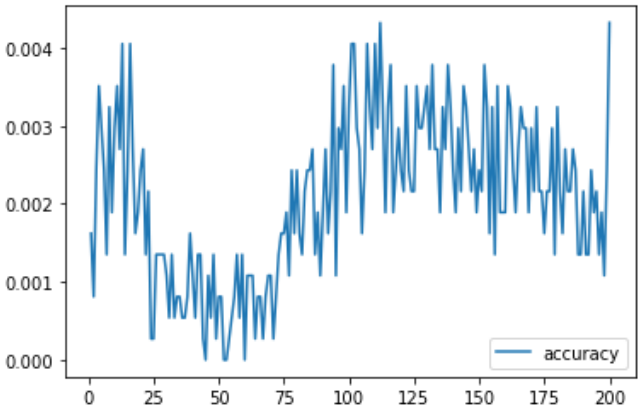
Out[35]: <AxesSubplot:>



In [36]:

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

Out[36]: <AxesSubplot:>


0.004
0.003
0.002
0.001
0.000
0
25
50
75
100
125
150
175
200
accuracy

In [ ]: