import numpy as np

from sklearn.linear\_model import LogisticRegression

from sklearn.feature\_selection import RFE

X = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9], [10, 11, 12]])

y = np.array([0, 1, 0, 1])

model = LogisticRegression()

rfe = RFE(model, 2)

fit = rfe.fit(X, y)

print(f"Num Features: {fit.n\_features\_}")

print(f"Selected Features: {fit.support\_}")

print(f"Feature Ranking: {fit.ranking\_}")

Feature transformation alters the data's structure or scale to make it more suited for model training, utilizing techniques like PCA to minimize dimensionality while maintaining critical information.

import numpy as np

from sklearn.decomposition import PCA

X = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9], [10, 11, 12]])

pca = PCA(n\_components=2)

principal\_components = pca.fit\_transform(X)

print(f"Principal Components:\n{principal\_components}")

Feature creation produces new features by merging or altering existing ones, revealing hidden patterns in data. Automated programs, like FeatureTools, can generate features automatically.

import featuretools as ft

import pandas as pd

data = {'id': [1, 2, 3, 4], 'value': [10, 20, 30, 40]}

df = pd.DataFrame(data)

es = ft.EntitySet(id='data')

es.entity\_from\_dataframe(entity\_id='df', dataframe=df, index='id')

feature\_matrix, feature\_defs = ft.dfs(entityset=es, target\_entity='df')

print(feature\_matrix)

Automated feature engineering systems employ AI to iteratively evaluate and validate new features before selecting the best for model training. For example, TPOT can automate feature engineering and model selection

from tpot import TPOTClassifier

from sklearn.datasets import load\_iris

from sklearn.model\_selection import train\_test\_split

iris = load\_iris()

X\_train, X\_test, y\_train, y\_test = train\_test\_split(iris.data, iris.target, test\_size=0.2, random\_state=42)

tpot = TPOTClassifier(verbosity=2, generations=5, population\_size=20)

tpot.fit(X\_train, y\_train)

print(tpot.score(X\_test, y\_test))

tpot.export('tpot\_pipeline.py')