Mushroom Madness!

Toxicity Safety Guide

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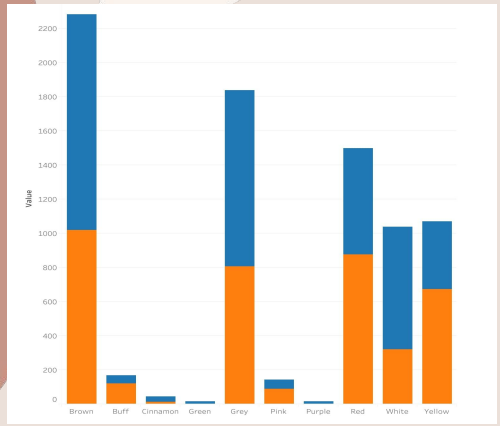
Choosing Our Dataset

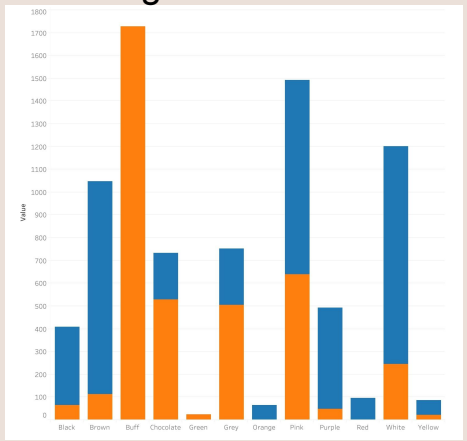
- For this project, we decided to run a Logistic Regression and Random Forest Classifier in an attempt to test data compiled by the UC Irvine Machine Learning Repository, titled “Mushroom”.
- We were testing this to see if it is a good dataset for predicting the toxicity of mushrooms, and what mushroom attributes are a good indicator of edibility/toxicity
- Each mushroom in our dataset was given an indicator of “edible” or “poisonous”, whereas other attributes have several indicators
- Key indicators found through this process are the color of the mushroom’s cap, gills, and stalk, as well as odor, habitat, and bruising.

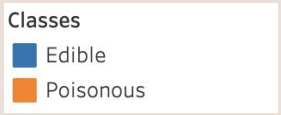
Visualizations

cap-color



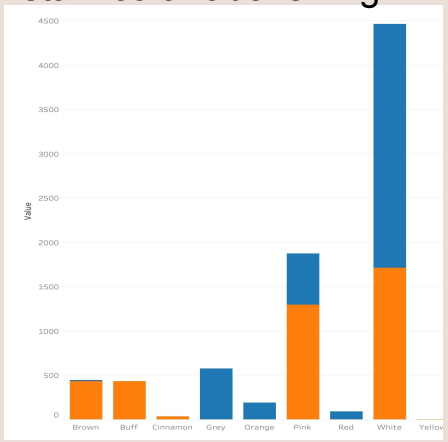
gill-color



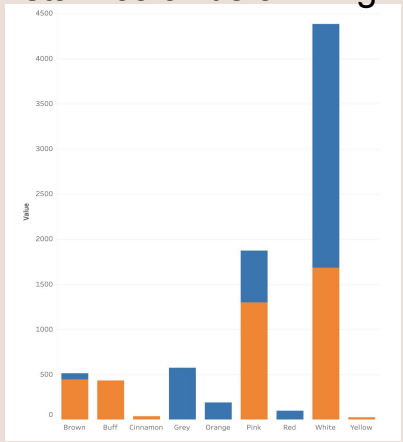


- Visual appearances, like color, can help indicate if a mushroom is toxic or not.
- Gill-color, stalk-color, and spore-print-color are good indicators for toxicity
- Cap-color is harder to predict

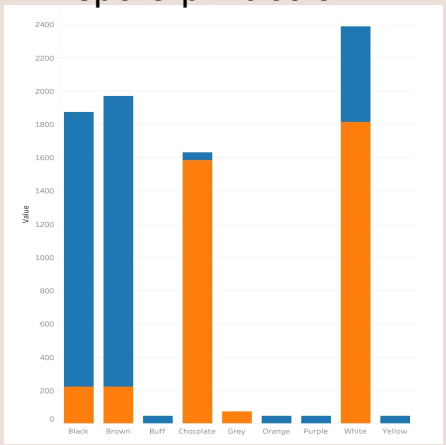
stalk-color-above-ring



stalk-color-below-ring

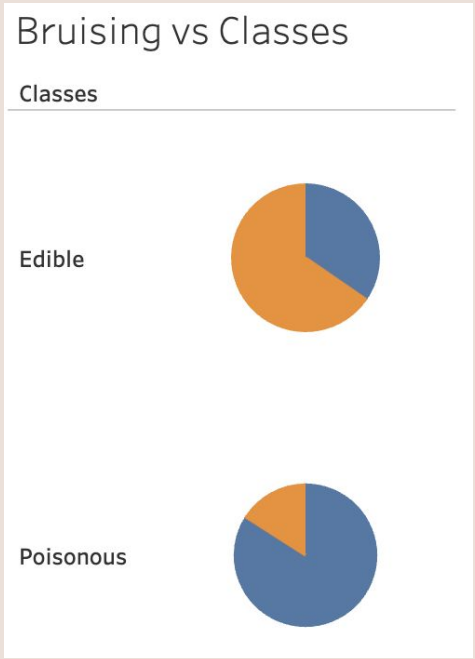


spore-print-color



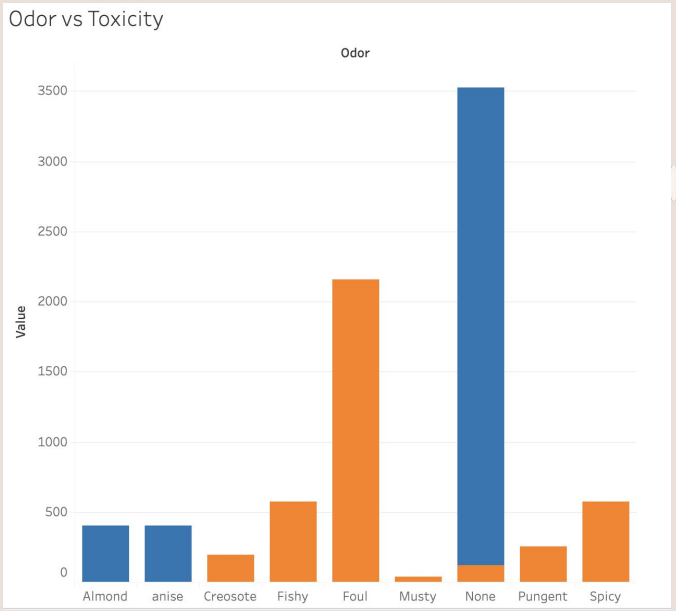
Visualizations

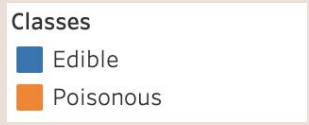
Bruising



Bruising for mushrooms is an indicator that a mushroom is more likely to be edible. (No bruising = likely poisonous)

Odor

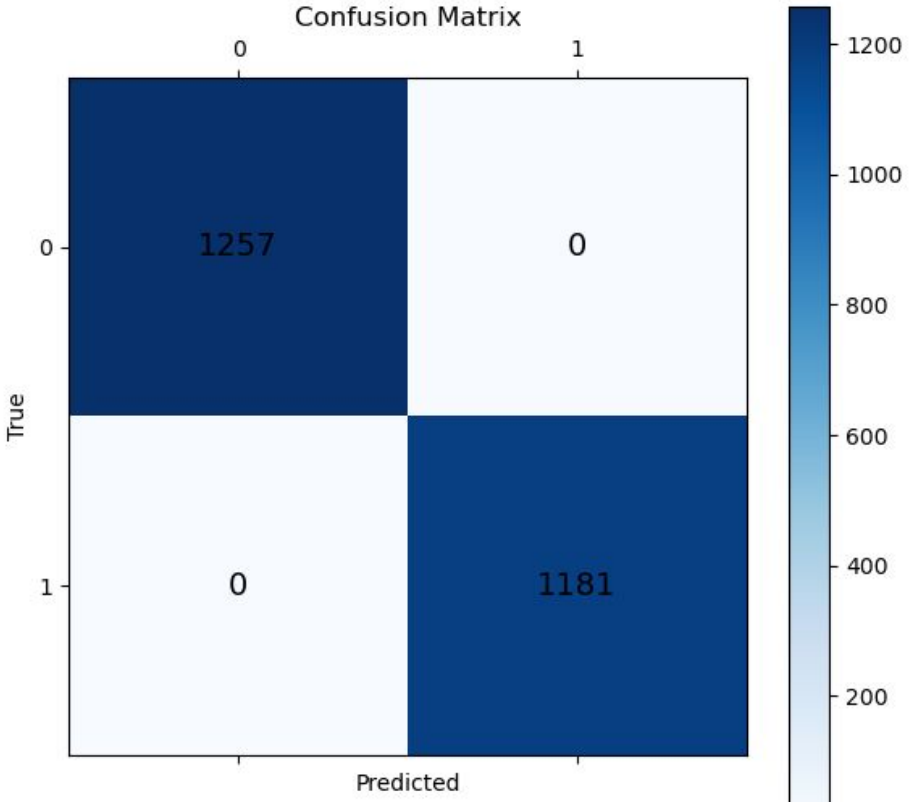


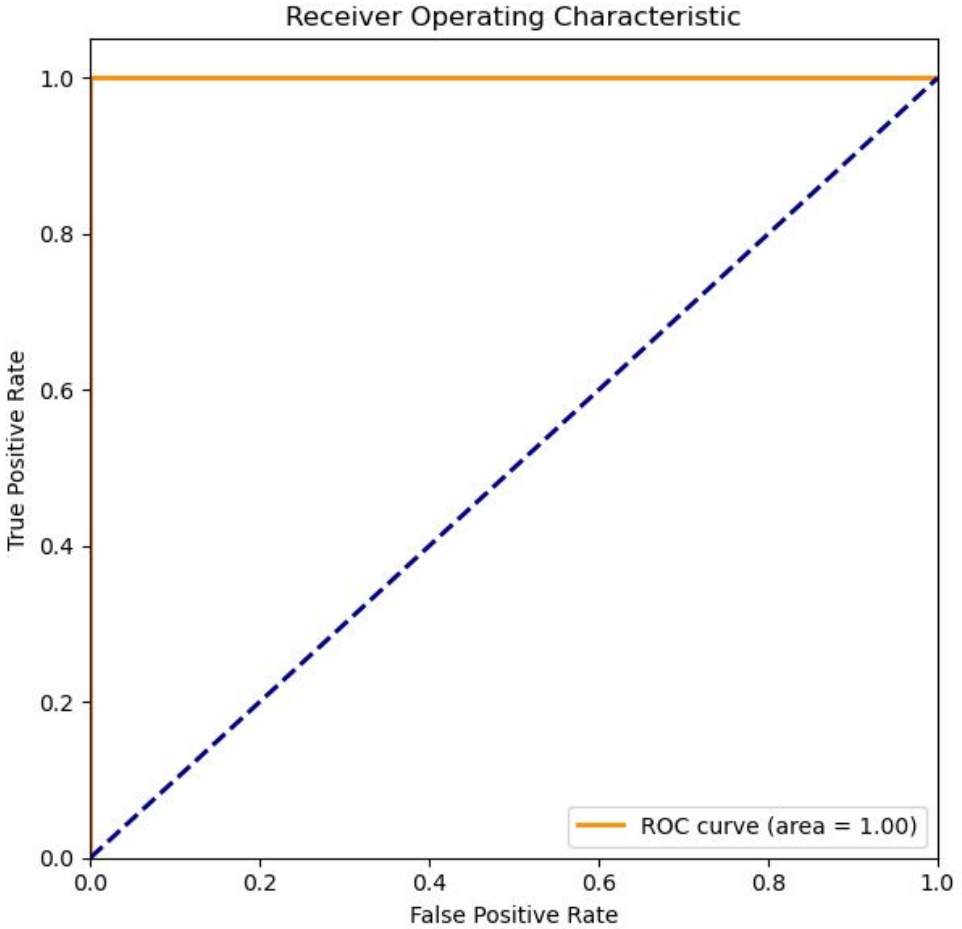


Types of odors can accurately indicate toxicity. Almond, anise, and scentless mushrooms are often edible. Other smells, notably unpleasant ones, are poisonous

Random Forest Classifier

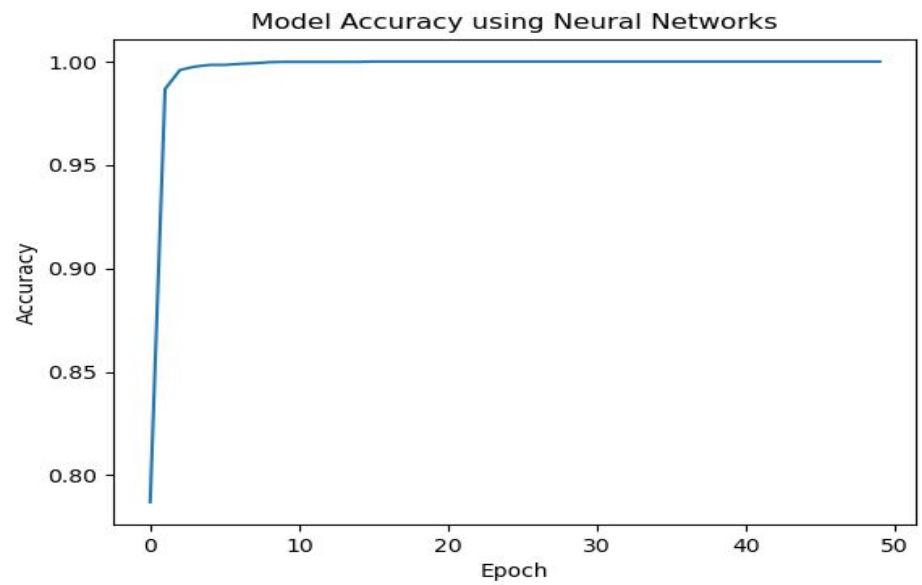
```
Accuracy: 1.0
Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00      1257
           1       1.00      1.00      1.00      1181

    accuracy                           1.00      2438
   macro avg       1.00      1.00      1.00      2438
weighted avg       1.00      1.00      1.00      2438
```

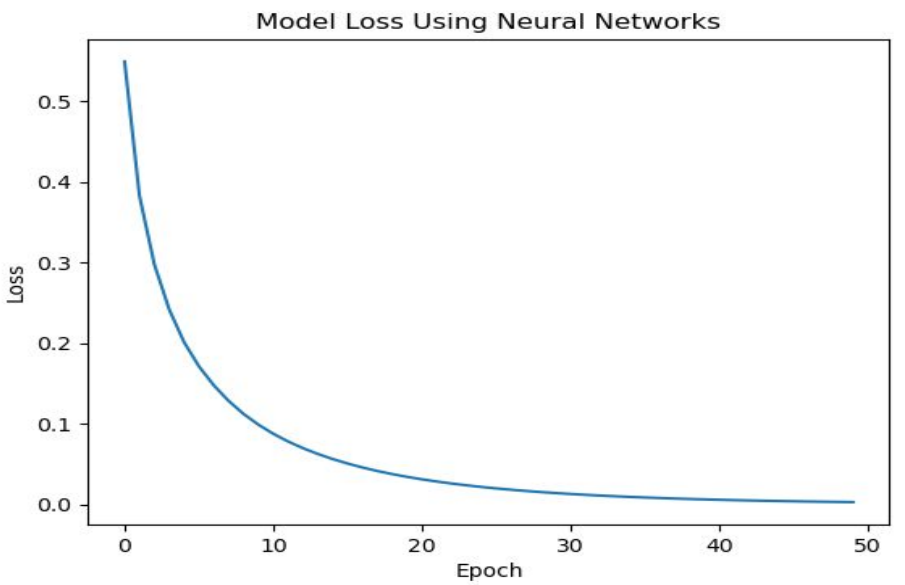

Confusion Matrix
0
1
0
1
1257
0
0
1181
True
Predicted
1200
1000
800
600
400
200
0


Receiver Operating Characteristic
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
ROC curve (area = 1.00)

Neural Networks

```
64/64 - 0s - 8ms/step - accuracy: 1.0000 - loss: 0.0026
Loss: 0.0026072934269905090, Accuracy: 1.0
```





Logistic Regression

```
    transformers=[
        ('cat', transformer, categorical_columns)
    ])

# Create an instance of LogisticRegression
logistic_regression_model = LogisticRegression()

# Create a pipeline
pipeline = Pipeline(steps=[
    ('preprocessor', preprocessor),
    ('classifier', logistic_regression_model)
])

# Train the model
```

```
results_df = pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
print(results_df)
```

[107] ✓ 0.0s

	Actual	Predicted
3816	e	e
5352	p	p
5307	p	p
4606	p	p
2993	e	e
...	...	...
4909	p	p
2026	e	e
2885	e	e
1727	e	e
4896	p	p

```
accuracy = accuracy_score(y_test, y_pred)
print(f'Accuracy: {accuracy}')
```

[109] ✓ 0.0s

```
Accuracy: 1.0
```

SVM

```python
# Create a ColumnTransformer
preprocessor = ColumnTransformer(
    transformers=[
        ('cat', transformer, categorical_columns)
    ])

# Create an instance of LogisticRegression
svc_model = SVC()

# Create a pipeline
pipeline = Pipeline(steps=[
    ('preprocessor', preprocessor),
    ('classifier', svc_model)
])

# Train the model
pipeline.fit(X_train, y_train)
```

```python
results_df = pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
print(results_df)
```

[6] ✓ 0.0s

	Actual	Predicted
3816	e	e
5352	p	p
5307	p	p
4606	p	p
2993	e	e
...	...	...
4909	p	p
2026	e	e
2885	e	e
1727	e	e
4896	p	p

```python
accuracy = accuracy_score(y_test, y_pred)
print(f'Accuracy: {accuracy}')
```

[118] ✓ 0.0s

```
Accuracy: 1.0
```

Thank you for listening!

Credit | Image: Unsplash

EaTemp