Ethical Considerations & Troubleshooting Challenge

1. Ethical Considerations

Potential Biases in the Amazon Reviews Model:

- **Data Bias:**
  If the dataset over-represents certain products, brands, or user demographics, the sentiment and entity recognition results may reflect those biases and not generalize well.
- **Annotation Bias:**
  VADER may not capture nuanced or culturally specific sentiment, which can lead to misclassification for certain groups.
- **NER Model Bias:**
  spaCy's NER model may miss or mislabel entities that are specific to Amazon's ecosystem or niche brands.

Mitigation Strategies:

- **TensorFlow Fairness Indicators:**
  Can help check performance across user groups and product categories to spot bias.
- **spaCy's Rule-Based Systems:**
  Use `Matcher` or `EntityRuler` to recognize specific brands or terms, improving consistency and reducing bias.

2. Troubleshooting Challenge

Example Buggy TensorFlow Script:

```
python
CopyEdit
import tensorflow as tf

model = tf.keras.Sequential([
   tf.keras.layers.Dense(64, activation='relu', input_shape=(100,)),
   tf.keras.layers.Dense(1)
])

model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
model.fit(X_train, y_train, epochs=5)
```

Problems:

- Wrong loss function for binary classification.
- Missing `sigmoid` activation in the output layer.

Fixed Code:

python
CopyEdit

```
import tensorflow as tf

model = tf.keras.Sequential([
    tf.keras.layers.Dense(64, activation='relu', input_shape=(100,)),
    tf.keras.layers.Dense(1, activation='sigmoid')
])

model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
model.fit(X_train, y_train, epochs=5)
```

Summary of Fixes:

- Used `sigmoid` activation for binary output.
- Changed loss to `binary_crossentropy`.
- Confirmed that `y_train` contains binary labels (0 or 1).