4_eval

August 26, 2025

1 Evaluate Prediction API

1.1 Import lib

[17]:
```
import requests
from pathlib import Path
import pandas as pd
import json
from sklearn.metrics import multilabel_confusion_matrix, confusion_matrix,␣
↪ConfusionMatrixDisplay, classification_report
import numpy as np
import matplotlib.pyplot as plt
```

[18]:
```
API_ENDPOINT = 'http://localhost:8000/api'
ROOT_PATH = Path.cwd().parent
```

[26]:
```
def plot_confuse(y_true, y_pred, labels=[]):
    if len(labels) > 0:
        yt = y_true.values if hasattr(y_true, "values") else np.asarray(y_true)
        yp = y_pred.values if hasattr(y_pred, "values") else np.asarray(y_pred)
        if yt.ndim != 1 or yp.ndim != 1:
            raise ValueError("For single-label, y_true and y_pred must be 1D.")
        if yt.shape[0] != yp.shape[0]:
            raise ValueError(f"Length mismatch: y_true {yt.shape[0]} vs y_pred␣
↪{yp.shape[0]}")
        cm = confusion_matrix(yt, yp, labels=[0,1])
        fig, ax = plt.subplots(figsize=(4.5, 4.5))
        disp = ConfusionMatrixDisplay(confusion_matrix=cm,
                                      display_labels=labels if labels else␣
↪[0,1])
        disp.plot(cmap=plt.cm.Blues, ax=ax, values_format="d", colorbar=False)
        plt.tight_layout()
        plt.show()

    else:
        cm_list = multilabel_confusion_matrix(y_true, y_pred)
        n = len(y_true.columns)
        _, axs = plt.subplots(1, n, figsize=(6*n, 5))
```

```
    for i in range(n):
        disp = ConfusionMatrixDisplay(confusion_matrix=cm_list[i],␣
↪display_labels=[f"Not {y_true.columns[i]}", y_true.columns[i]])
        disp.plot(cmap=plt.cm.Blues, ax=axs[i] if n > 1 else axs,␣
↪values_format="d", colorbar=False)
        axs[i].set_title(y_true.columns[i])
plt.show()
```

1.2 Current Version

[4]:
```
meta = requests.get(API_ENDPOINT + '/system/versions')
meta = meta.json()
print(json.dumps(meta, indent=4))
```


```
{
    "status": "Rug Pull Detection API is running.",
    "is_trained": true,
    "current_version": "20250825_151608_1_1",
    "timestamp": "2025-08-26T09:31:50.398328",
    "version_last_modified": "2025-08-26T06:41:53.979620",
    "label_names": [
        "Address Restrict",
        "Amount Restrict",
        "Hidden Balance Modification",
        "Hidden Mint/Burn",
        "Leak",
        "Limit",
        "Mint",
        "Modifiable External Call",
        "Modifiable Tax Address",
        "Modifiable Tax Rate",
        "TimeStamp Restrict",
        "Amount Limit",
        "Exchange Permission",
        "Exchange Suspension",
        "Fee Manipulation",
        "Invalid Callback",
        "Trapdoor"
    ],
    "n_labels": 17,
    "train_size": 1200,
    "test_size": 300,
    "notes": "Optuna 15 trials per model; test split=0.2.",
    "model_files": {
        "general_model": {
            "exists": true,
            "size": 313962,
            "mtime": "2025-08-26T03:24:03.950378",
```

```
            "path": "/app/backend/models/current/general_model.pkl"
        },
        "sol_model": {
            "exists": true,
            "size": 1446125,
            "mtime": "2025-08-26T03:24:06.852992",
            "path": "/app/backend/models/current/sol_model.pkl"
        },
        "opcode_model": {
            "exists": true,
            "size": 54686366,
            "mtime": "2025-08-26T03:26:05.864065",
            "path": "/app/backend/models/current/opcode_model.pkl"
        },
        "gru_model": {
            "exists": true,
            "size": 8415724,
            "mtime": "2025-08-26T06:32:35.902299",
            "path": "/app/backend/models/current/gru_model.keras"
        },
        "if_general_model": {
            "exists": true,
            "size": 3955928,
            "mtime": "2025-08-26T06:33:21.274483",
            "path": "/app/backend/models/current/if_general_model.pkl"
        },
        "if_sol_model": {
            "exists": true,
            "size": 33554840,
            "mtime": "2025-08-26T06:33:26.407297",
            "path": "/app/backend/models/current/if_sol_model.pkl"
        },
        "if_opcode_model": {
            "exists": true,
            "size": 1005911,
            "mtime": "2025-08-26T06:33:34.808594",
            "path": "/app/backend/models/current/if_opcode_model.pkl"
        },
        "gru_ae_model": {
            "exists": true,
            "size": 5083048,
            "mtime": "2025-08-26T06:37:44.855742",
            "path": "/app/backend/models/current/gru_ae_model.keras"
        }
    },
    "clf_fusion": {
        "weights": {
            "general": 0.7872198690796577,
```

```
            "sol": 0.24218493956991577,
            "opcode": 0.2589465892599484,
            "gru": 0.46554199075819136
        },
        "thresholds": {
            "Address Restrict": 0.3836877787446481,
            "Amount Restrict": 0.3580143690717003,
            "Hidden Balance Modification": 0.5566704448221383,
            "Hidden Mint/Burn": 0.525055494560247,
            "Leak": 0.5654100693921833,
            "Limit": 0.3735308474361557,
            "Mint": 0.342498671716905,
            "Modifiable External Call": 0.4173173319928712,
            "Modifiable Tax Address": 0.47807790074691203,
            "Modifiable Tax Rate": 0.5868287198333723,
            "TimeStamp Restrict": 0.4355932567675713,
            "Amount Limit": 0.5167708130191594,
            "Exchange Permission": 0.3853885406918155,
            "Exchange Suspension": 0.6031984910527495,
            "Fee Manipulation": 0.5987357592236902,
            "Invalid Callback": 0.44855869045511043,
            "Trapdoor": 0.4183144951733215
        },
        "f1_score": 0.847257965795563
    },
    "anomaly_fusion": {
        "weights": {
            "if_general": 0.7659883326636499,
            "if_sol": 0.19525049383601167,
            "if_opcode": 0.5658932543556239,
            "ae_timeline": 0.12992522927882935
        },
        "threshold": 0.3200121097809793,
        "f1_score": 0.4881253158160687,
        "ae_threshold": 0.0
    },
    "backup_versions": []
}
```


1.3 Evaluate on CRPWarning Ground Truth

[5]:
```
ground_df = pd.read_excel(ROOT_PATH / 'data/external/crpwarner/dataset/
↪groundtruth/groundTruth.xlsx', index_col='address')
ground_df.index = ground_df.index.str.lower()
```

[6]:
```
ground_df.head()
```

[6]:
```
                                            Mint  Leak  Limit
address
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381     0     0      0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1     0      1
```

[7]:
```python
res = requests.post(API_ENDPOINT + "/predict", json={"addresses": ground_df.
    ↪index.to_list()})
print("Status:", res.status_code)
print("Elapsed:", res.elapsed.total_seconds(), "seconds")
res = res.json()['results']
df = pd.DataFrame.from_dict(res, orient="index")
df.head()
```

```
Status: 200
Elapsed: 213.620452 seconds
```

[7]:
```
       labels  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302  {'Address Restrict': 1, 'Amount
Restrict': 1, …
0x2753dce37a7edb052a77832039bcc9aa49ad8b25  {'Address Restrict': 1, 'Amount
Restrict': 0, …
0x94b7d24552933f50a5a5705c446528806dcea381  {'Address Restrict': 0, 'Amount
Restrict': 1, …
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0x10f6f2b97f3ab29583d9d38babf2994df7220c21  {'Address Restrict': 0, 'Amount
Restrict': 0, …

  label_probs  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302  {'Address Restrict':
0.6057556970940429, 'Amou…
0x2753dce37a7edb052a77832039bcc9aa49ad8b25  {'Address Restrict':
0.6905174535481907, 'Amou…
0x94b7d24552933f50a5a5705c446528806dcea381  {'Address Restrict':
0.21008467032827421, 'Amo…
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093  {'Address Restrict':
0.21073564104015546, 'Amo…
0x10f6f2b97f3ab29583d9d38babf2994df7220c21  {'Address Restrict':
0.17137202234071047, 'Amo…

                                            anomaly  anomaly_score
0x93023f1d3525e273f291b6f76d2f5027a39bf302        1       0.462258
0x2753dce37a7edb052a77832039bcc9aa49ad8b25        1       0.580088
0x94b7d24552933f50a5a5705c446528806dcea381        1       0.462258
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093        1       0.462258
```

```
0x10f6f2b97f3ab29583d9d38babf2994df7220c21        1       0.462258
```

1.3.1 Labels

[8]:
```python
label_df = pd.DataFrame.from_records(df['labels'].tolist(), index=df.index)
label_df.head()
```

[8]:
```
                                            Address Restrict  Amount Restrict  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 1                1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 1                0
0x94b7d24552933f50a5a5705c446528806dcea381                 0                1
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 0                0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 0                0

                                            Hidden Balance Modification  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                            0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                            0
0x94b7d24552933f50a5a5705c446528806dcea381                            0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                            0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                            0

                                            Hidden Mint/Burn  Leak  Limit  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381                 0     0      0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 1     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 1     0      1

                                            Mint  Modifiable External Call  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1                          0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0                          0
0x94b7d24552933f50a5a5705c446528806dcea381     0                          0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0                          0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1                          0

                                            Modifiable Tax Address  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                       1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                       0
0x94b7d24552933f50a5a5705c446528806dcea381                       0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                       0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                       0

                                            Modifiable Tax Rate  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x94b7d24552933f50a5a5705c446528806dcea381                    0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                    0
```

```
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                        1

                                            TimeStamp Restrict  Amount Limit  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                   1             0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                   0             0
0x94b7d24552933f50a5a5705c446528806dcea381                   0             0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                   0             0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                   0             1

                                            Exchange Permission  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x94b7d24552933f50a5a5705c446528806dcea381                    0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                    0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                    1

                                            Exchange Suspension  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x94b7d24552933f50a5a5705c446528806dcea381                    0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                    0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                    1

                                            Fee Manipulation  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0
0x94b7d24552933f50a5a5705c446528806dcea381                 0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 1

                                            Invalid Callback  Trapdoor
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0         0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0         0
0x94b7d24552933f50a5a5705c446528806dcea381                 0         0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 0         0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 0         1
```

[9]:
```
y_true = ground_df
y_pred = label_df.loc[y_true.index, y_true.columns]
```

[10]:
```
y_true.head()
```

[10]:
```
                                            Mint  Leak  Limit
address
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381     0     0      0
```

```
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1     0      1
```

[11]:
```
y_pred.head()
```

[11]:
```
                                            Mint  Leak  Limit
address
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381     0     0      0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1     0      1
```

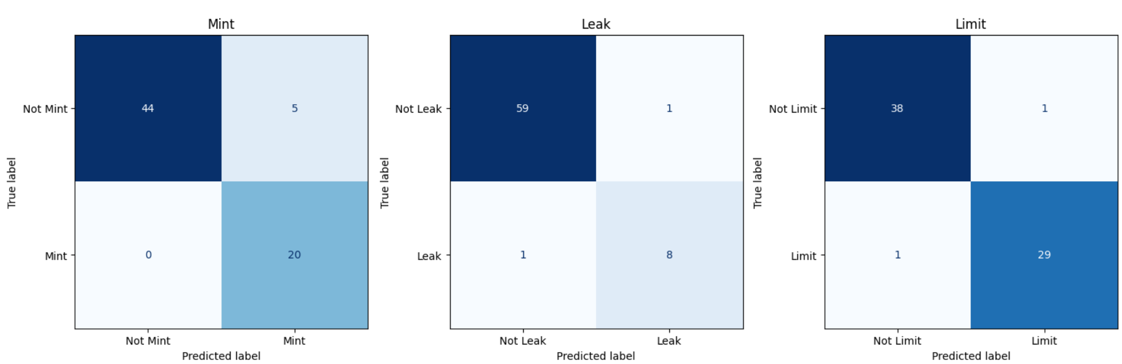
[20]:
```
print(classification_report(
  y_true.values,
  y_pred.values,
  target_names=y_true.columns,
  zero_division=0))
```

```
              precision    recall  f1-score   support

        Mint       0.80      1.00      0.89        20
        Leak       0.89      0.89      0.89         9
       Limit       0.97      0.97      0.97        30

   micro avg       0.89      0.97      0.93        59
   macro avg       0.89      0.95      0.91        59
weighted avg       0.90      0.97      0.93        59
 samples avg       0.59      0.59      0.59        59
```

[23]:
```
plot_confuse(y_true, y_pred)
```



1.3.2 Anomaly

[14]:
```
anomaly_true = (y_true.astype(int).sum(axis=1) > 0).astype(int)
anomaly_pred = df.loc[y_true.index, "anomaly"].astype(int)
```

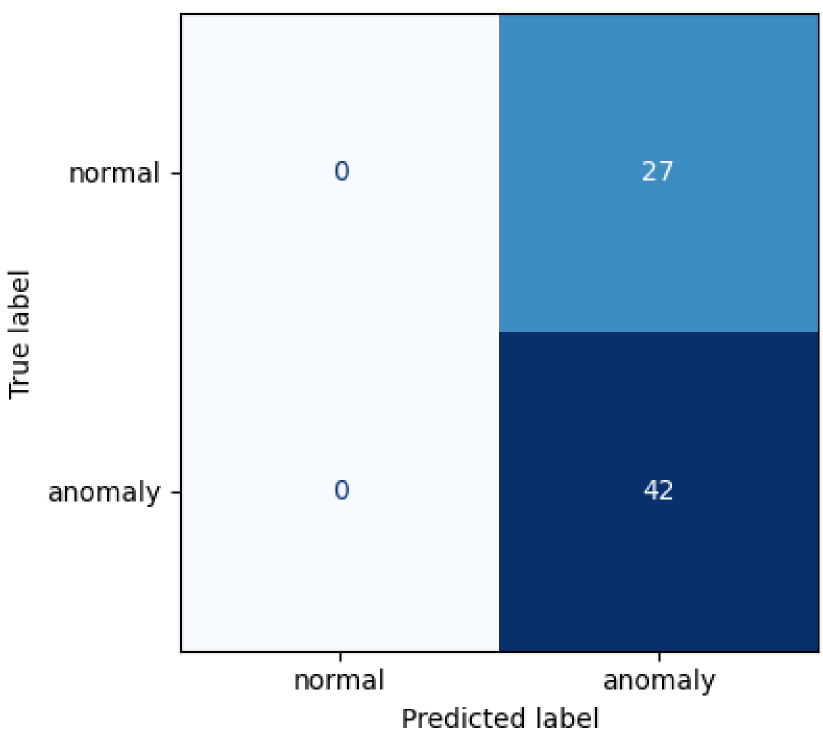
[15]:
```
labels = ['normal', 'anomaly']
print(classification_report(
  anomaly_true,
  anomaly_pred,
  target_names=labels,
  zero_division=0))
```

```
              precision    recall  f1-score   support

      normal       0.00      0.00      0.00        27
     anomaly       0.61      1.00      0.76        42

    accuracy                           0.61        69
   macro avg       0.30      0.50      0.38        69
weighted avg       0.37      0.61      0.46        69
```

[27]:
```
plot_confuse(anomaly_true, anomaly_pred, labels)
```



1.4 Evaluate on Large Sample (Mint)

[52]:
```
label = 'Mint'
temp_df = pd.read_excel(ROOT_PATH / f'data/external/crpwarner/dataset/large/
 ↪sample/{label.lower()}.xlsx', index_col='Address')
temp_df['TP?'] = temp_df['TP?'].map({'Yes': 1, 'No': 0})
temp_df = temp_df.rename(columns={'TP?': label})
temp_df.index = temp_df.index.str.lower()
```

[54]:
```
temp_df.head()
```

[54]:
```
                                            Mint
Address
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8     1
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04     1
0xa1b756be589441519b1a08e16bc4f60ab177d916     1
0x514bc174df04a4b04ae2be81ee8c788c3796b06b     1
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46     1
```

[31]:
```
res = requests.post(API_ENDPOINT + "/predict", json={"addresses": temp_df.index.
 ↪to_list()})
print("Status:", res.status_code)
print("Elapsed:", res.elapsed.total_seconds(), "seconds")
res = res.json()['results']
df = pd.DataFrame.from_dict(res, orient="index")
df.head()
```

```
Status: 200
Elapsed: 288.838395 seconds
```

[31]:
```
       labels  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04  {'Address Restrict': 0, 'Amount
Restrict': 1, …
0xa1b756be589441519b1a08e16bc4f60ab177d916  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0x514bc174df04a4b04ae2be81ee8c788c3796b06b  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46  {'Address Restrict': 0, 'Amount
Restrict': 1, …

  label_probs  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8  {'Address Restrict':
0.07362741922920765, 'Amo…
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04  {'Address Restrict':
0.02257792597178286, 'Amo…
0xa1b756be589441519b1a08e16bc4f60ab177d916  {'Address Restrict':
```

```
0.06266966197385725, 'Amo…
0x514bc174df04a4b04ae2be81ee8c788c3796b06b  {'Address Restrict':
0.2823561291072637б, 'Amo…
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46  {'Address Restrict':
0.026694638981940244, 'Am…

                                            anomaly  anomaly_score
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8        1       0.462258
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04        1       0.462258
0xa1b756be589441519b1a08e16bc4f60ab177d916        1       0.580088
0x514bc174df04a4b04ae2be81ee8c788c3796b06b        1       0.462258
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46        1       0.462258
```

1.4.1 Labels

[32]:
```
label_df = pd.DataFrame.from_records(df['labels'].tolist(), index=df.index)
label_df.head()
```

[32]:
```
                                            Address Restrict  Amount Restrict  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                 0                0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                 0                1
0xa1b756be589441519b1a08e16bc4f60ab177d916                 0                0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                 0                0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                 0                1

                                            Hidden Balance Modification  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                            0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                            0
0xa1b756be589441519b1a08e16bc4f60ab177d916                            0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                            0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                            0

                                            Hidden Mint/Burn  Leak  Limit  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                 0     1      1
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                 1     0      1
0xa1b756be589441519b1a08e16bc4f60ab177d916                 1     0      1
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                 0     1      1
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                 1     0      1

                                            Mint  Modifiable External Call  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8     1                         0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04     1                         0
0xa1b756be589441519b1a08e16bc4f60ab177d916     1                         0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b     1                         0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46     1                         0

                                            Modifiable Tax Address  \
```

```
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                       0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                       0
0xa1b756be589441519b1a08e16bc4f60ab177d916                       0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                       0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                       0

                                            Modifiable Tax Rate  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                    0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                    0
0xa1b756be589441519b1a08e16bc4f60ab177d916                    0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                    0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                    0

                                            TimeStamp Restrict  Amount Limit  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                   0             0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                   0             0
0xa1b756be589441519b1a08e16bc4f60ab177d916                   0             0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                   0             0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                   0             0

                                            Exchange Permission  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                    0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                    0
0xa1b756be589441519b1a08e16bc4f60ab177d916                    0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                    0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                    0

                                            Exchange Suspension  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                    0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                    0
0xa1b756be589441519b1a08e16bc4f60ab177d916                    0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                    0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                    0

                                            Fee Manipulation  \
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                 0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                 0
0xa1b756be589441519b1a08e16bc4f60ab177d916                 0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                 0
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                 0

                                            Invalid Callback  Trapdoor
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8                 0         0
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04                 0         0
0xa1b756be589441519b1a08e16bc4f60ab177d916                 0         0
0x514bc174df04a4b04ae2be81ee8c788c3796b06b                 0         1
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46                 0         0
```

[33]:
```python
y_true = temp_df
y_pred = label_df.loc[y_true.index, y_true.columns]
```

[34]:
```python
y_true.head()
```

[34]:
```
                                            Mint
Address
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8     1
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04     1
0xa1b756be589441519b1a08e16bc4f60ab177d916     1
0x514bc174df04a4b04ae2be81ee8c788c3796b06b     1
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46     1
```

[35]:
```python
y_pred.head()
```

[35]:
```
                                            Mint
Address
0x0fef20d2c4ee011fa0389e69e9fa92a2291b63c8     1
0xd7cc0deb9dd11be95068bf2d7a3d082b8ba9bf04     1
0xa1b756be589441519b1a08e16bc4f60ab177d916     1
0x514bc174df04a4b04ae2be81ee8c788c3796b06b     1
0x1354c8c1a66c2573ce9cc3e92e98d17869501a46     1
```

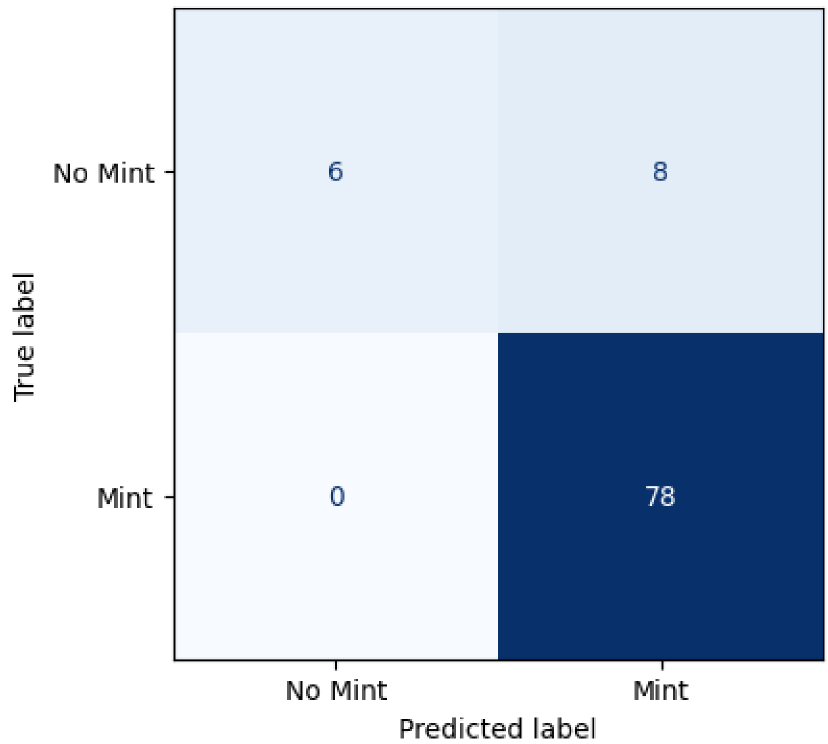
[36]:
```python
labels = [f'No {label}', label]
print(classification_report(
  y_true.values,
  y_pred.values,
  target_names=labels,
  zero_division=0))
```

```
              precision    recall  f1-score   support

     No Mint       1.00      0.43      0.60        14
        Mint       0.91      1.00      0.95        78

    accuracy                           0.91        92
   macro avg       0.95      0.71      0.78        92
weighted avg       0.92      0.91      0.90        92
```

[49]:
```python
plot_confuse(y_true.iloc[:, 0].astype(int).to_numpy(), y_pred.iloc[:, 0].
 ↪astype(int).to_numpy(), labels)
```



1.5 Evaluate on Large Sample (Leak)

[68]:
```
label = 'Leak'
temp_df = pd.read_excel(ROOT_PATH / f'data/external/crpwarner/dataset/large/
 ↪sample/{label.lower()}.xlsx', index_col='Address')
temp_df['TP?'] = temp_df['TP?'].map({'Yes': 1, 'No': 0})
temp_df = temp_df.rename(columns={'TP?': label})
temp_df.index = temp_df.index.str.lower()
```

[69]:
```
temp_df.head()
```

[69]:
```
                                            Leak
Address
0x0290ea3c72898172568918776 3f6c63a68e192b8    1
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6     1
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60     0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4     1
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73     1
```

[70]:
```
res = requests.post(API_ENDPOINT + "/predict", json={"addresses": temp_df.index.
 ↪to_list()})
print("Status:", res.status_code)
```

```
print("Elapsed:", res.elapsed.total_seconds(), "seconds")
res = res.json()['results']
df = pd.DataFrame.from_dict(res, orient="index")
df.head()
```

```
Status: 200
Elapsed: 315.922271 seconds
```

[70]:
```
                                                  labels  \
0x0290ea3c7289817256891877 63f6c63a68e192b8  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6  {'Address Restrict': 0, 'Amount
Restrict': 1, …
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60  {'Address Restrict': 0, 'Amount
Restrict': 1, …
0x10c8324b20b7266c445944f043f53f6a77ea0bd4  {'Address Restrict': 0, 'Amount
Restrict': 1, …
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73  {'Address Restrict': 1, 'Amount
Restrict': 0, …

                                                 label_probs  \
0x0290ea3c728981725689187763f6c63a68e192b8  {'Address Restrict':
0.048798204743014884, 'Am…
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6  {'Address Restrict':
0.01176696857294976, 'Amo…
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60  {'Address Restrict':
0.02293397199611057, 'Amo…
0x10c8324b20b7266c445944f043f53f6a77ea0bd4  {'Address Restrict':
0.02781452631039047, 'Amo…
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73  {'Address Restrict':
0.6620448897415417, 'Amou…

                                            anomaly  anomaly_score
0x0290ea3c728981725689187763f6c63a68e192b8        1       0.462258
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6        1       0.462258
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60        1       0.462258
0x10c8324b20b7266c445944f043f53f6a77ea0bd4        1       0.462258
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73        1       0.462258
```

1.5.1 Labels

[71]:
```
label_df = pd.DataFrame.from_records(df['labels'].tolist(), index=df.index)
label_df.head()
```

[71]:
```
                                            Address Restrict  Amount Restrict  \
0x0290ea3c728981725689187763f6c63a68e192b8                 0                0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6                 0                1
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60                 0                1
```

0x10c8324b20b7266c445944f043f53f6a77ea0bd4	0	1
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	1	0

	Hidden Balance Modification \
0x0290ea3c728981725689187763f6c63a68e192b8	0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6	0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60	0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4	0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	0

	Hidden Mint/Burn	Leak	Limit \
0x0290ea3c728981725689187763f6c63a68e192b8	1	1	1
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6	1	1	1
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60	1	0	1
0x10c8324b20b7266c445944f043f53f6a77ea0bd4	1	1	1
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	0	1	1

	Mint	Modifiable External Call \
0x0290ea3c728981725689187763f6c63a68e192b8	1	0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6	1	0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60	1	0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4	1	0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	1	0

	Modifiable Tax Address \
0x0290ea3c728981725689187763f6c63a68e192b8	0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6	0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60	0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4	0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	0

	Modifiable Tax Rate \
0x0290ea3c728981725689187763f6c63a68e192b8	0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6	0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60	0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4	0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	0

	TimeStamp Restrict	Amount Limit \
0x0290ea3c728981725689187763f6c63a68e192b8	0	0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6	0	0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60	0	0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4	0	0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73	0	0

	Exchange Permission \
0x0290ea3c728981725689187763f6c63a68e192b8	0

```
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6                        0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60                        0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4                        0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73                        1

                                            Exchange Suspension  \
0x0290ea3c72898172568918 7763f6c63a68e192b8                        0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6                        0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60                        0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4                        0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73                        0

                                            Fee Manipulation  \
0x0290ea3c7289817256891877 63f6c63a68e192b8                     0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6                     0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60                     0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4                     0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73                     0

                                            Invalid Callback  Trapdoor
0x0290ea3c72898172568918 7763f6c63a68e192b8                     0         0
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6                     0         0
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60                     0         0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4                     0         0
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73                     0         1
```

[72]:

```
y_true = temp_df
y_pred = label_df.loc[y_true.index, y_true.columns]
```

[73]:

```
y_true.head()
```

[73]:

```
                                            Leak
Address
0x0290ea3c72898172568918 7763f6c63a68e192b8     1
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6     1
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60     0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4     1
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73     1
```

[74]:

```
y_pred.head()
```

[74]:

```
                                            Leak
Address
0x0290ea3c72898172568918 7763f6c63a68e192b8     1
0x054ad3cd4a66f14bf5c0de2548a53be66995a4f6     1
0x0566c17dc2a9efcaa2f63e04cf06a69e8fc77f60     0
0x10c8324b20b7266c445944f043f53f6a77ea0bd4     1
```

```
0x10cc060f6f9b2e5dcdb23f1361e4b368a7daec73     1
```

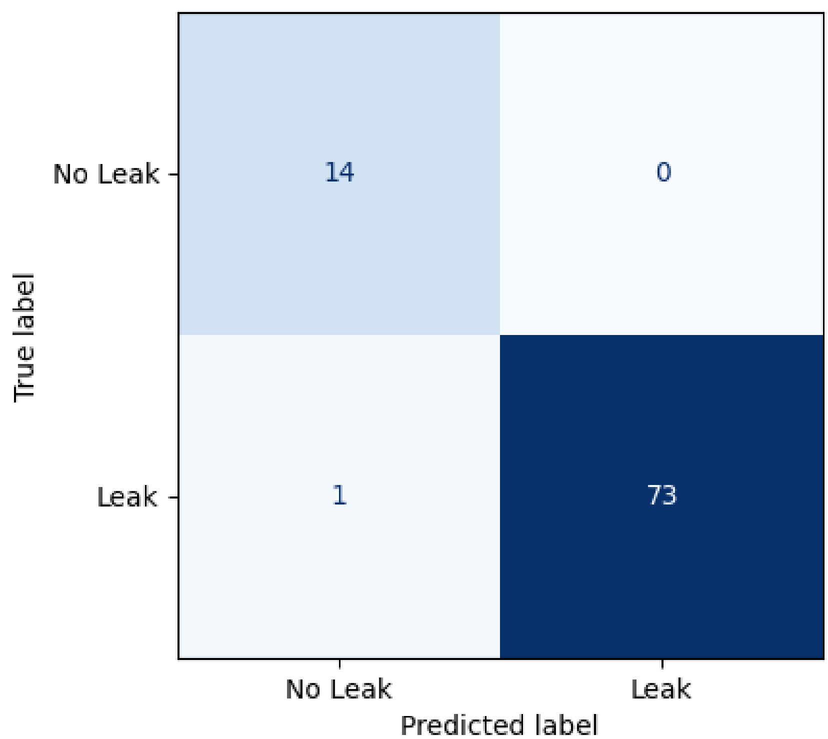
[75]:
```
labels = [f'No {label}', label]
print(classification_report(
  y_true.values,
  y_pred.values,
  target_names=labels,
  zero_division=0))
```

```
              precision    recall  f1-score   support

     No Leak       0.93      1.00      0.97        14
        Leak       1.00      0.99      0.99        74

    accuracy                           0.99        88
   macro avg       0.97      0.99      0.98        88
weighted avg       0.99      0.99      0.99        88
```

[76]:
```
plot_confuse(y_true.iloc[:, 0].astype(int).to_numpy(), y_pred.iloc[:, 0].
 ↪astype(int).to_numpy(), labels)
```



1.6 Evaluate on Large Sample (Limit)

[77]:
```python
label = 'Limit'
temp_df = pd.read_excel(ROOT_PATH / f'data/external/crpwarner/dataset/large/
↪sample/{label.lower()}.xlsx', index_col='Address')
temp_df['TP?'] = temp_df['TP?'].map({'Yes': 1, 'No': 0})
temp_df = temp_df.rename(columns={'TP?': label})
temp_df.index = temp_df.index.str.lower()
```

[78]:
```python
temp_df.head()
```

[78]:
```
                                            Limit
Address
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8      1
0xa623b5a542c0d7daadef321042a04c600b03a8cb      1
0xe412189da2dfa188a1a61633114b8732bbbfba19      1
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844      1
0x921a5dce3dfed5cccfbb2e593f2978533bc66110      1
```

[79]:
```python
res = requests.post(API_ENDPOINT + "/predict", json={"addresses": temp_df.index.
↪to_list()})
print("Status:", res.status_code)
print("Elapsed:", res.elapsed.total_seconds(), "seconds")
res = res.json()['results']
df = pd.DataFrame.from_dict(res, orient="index")
df.head()
```

```
Status: 200
Elapsed: 304.757515 seconds
```

[79]:
```
      labels  \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8  {'Address Restrict': 0, 'Amount
Restrict': 1, …
0xa623b5a542c0d7daadef321042a04c600b03a8cb  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0xe412189da2dfa188a1a61633114b8732bbbfba19  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844  {'Address Restrict': 0, 'Amount
Restrict': 0, …
0x921a5dce3dfed5cccfbb2e593f2978533bc66110  {'Address Restrict': 0, 'Amount
Restrict': 0, …

  label_probs  \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8  {'Address Restrict':
0.0382126769557718, 'Amou…
0xa623b5a542c0d7daadef321042a04c600b03a8cb  {'Address Restrict':
0.018721354330240796, 'Am…
0xe412189da2dfa188a1a61633114b8732bbbfba19  {'Address Restrict':
```

```
0.07091774129934543, 'Amo…
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844  {'Address Restrict':
0.016461383458478366, 'Am…
0x921a5dce3dfed5cccfbb2e593f2978533bc66110  {'Address Restrict':
0.048491252370566174, 'Am…

                                            anomaly  anomaly_score
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8        1       0.462258
0xa623b5a542c0d7daadef321042a04c600b03a8cb        1       0.462258
0xe412189da2dfa188a1a61633114b8732bbbfba19        1       0.462258
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844        1       0.462258
0x921a5dce3dfed5cccfbb2e593f2978533bc66110        1       0.462258
```

1.6.1 Labels

[80]:
```python
label_df = pd.DataFrame.from_records(df['labels'].tolist(), index=df.index)
label_df.head()
```

[80]:
```
                                            Address Restrict  Amount Restrict  \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8                 0                1
0xa623b5a542c0d7daadef321042a04c600b03a8cb                 0                0
0xe412189da2dfa188a1a61633114b8732bbbfba19                 0                0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844                 0                0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110                 0                0

                                            Hidden Balance Modification  \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8                            0
0xa623b5a542c0d7daadef321042a04c600b03a8cb                            0
0xe412189da2dfa188a1a61633114b8732bbbfba19                            0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844                            0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110                            0

                                            Hidden Mint/Burn  Leak  Limit  \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8                 1     0      1
0xa623b5a542c0d7daadef321042a04c600b03a8cb                 0     0      1
0xe412189da2dfa188a1a61633114b8732bbbfba19                 1     0      1
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844                 1     1      1
0x921a5dce3dfed5cccfbb2e593f2978533bc66110                 0     0      1

                                            Mint  Modifiable External Call  \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8     1                         0
0xa623b5a542c0d7daadef321042a04c600b03a8cb     1                         0
0xe412189da2dfa188a1a61633114b8732bbbfba19     1                         0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844     1                         0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110     1                         0

                                            Modifiable Tax Address  \
```

0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0

	Modifiable Tax Rate \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0

	TimeStamp Restrict	Amount Limit \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0	0

	Exchange Permission \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0

	Exchange Suspension \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0

	Fee Manipulation \
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0

	Invalid Callback	Trapdoor
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8	0	0
0xa623b5a542c0d7daadef321042a04c600b03a8cb	0	0
0xe412189da2dfa188a1a61633114b8732bbbfba19	0	0
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844	0	0
0x921a5dce3dfed5cccfbb2e593f2978533bc66110	0	0

[81]:
```python
y_true = temp_df
y_pred = label_df.loc[y_true.index, y_true.columns]
```

[82]:
```python
y_true.head()
```

[82]:
```
                                            Limit
Address
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8      1
0xa623b5a542c0d7daadef321042a04c600b03a8cb      1
0xe412189da2dfa188a1a61633114b8732bbbfba19      1
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844      1
0x921a5dce3dfed5cccfbb2e593f2978533bc66110      1
```

[83]:
```python
y_pred.head()
```

[83]:
```
                                            Limit
Address
0xe5f3c6d2b47cbe2cf936b9521466bac2422ebef8      1
0xa623b5a542c0d7daadef321042a04c600b03a8cb      1
0xe412189da2dfa188a1a61633114b8732bbbfba19      1
0x9fcf7acdc11fd904c4b73a009909c7f00efc4844      1
0x921a5dce3dfed5cccfbb2e593f2978533bc66110      1
```

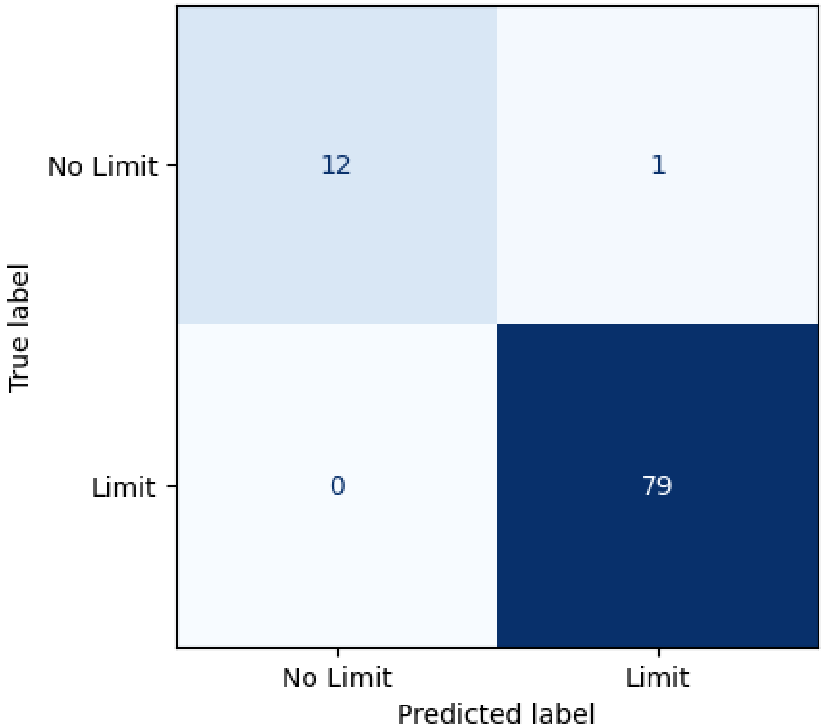
[84]:
```python
labels = [f'No {label}', label]
print(classification_report(
  y_true.values,
  y_pred.values,
  target_names=labels,
  zero_division=0))
```

```
              precision    recall  f1-score   support

    No Limit       1.00      0.92      0.96        13
       Limit       0.99      1.00      0.99        79

    accuracy                           0.99        92
   macro avg       0.99      0.96      0.98        92
weighted avg       0.99      0.99      0.99        92
```

[85]:
```python
plot_confuse(y_true.iloc[:, 0].astype(int).to_numpy(), y_pred.iloc[:, 0].
  ↪astype(int).to_numpy(), labels)
```



1.7 Evaluate on RPHunter

[92]:
```
rphunter_df = pd.read_csv(ROOT_PATH / 'data/rphunter-cleaned.csv',␣
 ↪index_col='Address')
rphunter_df.index = rphunter_df.index.str.lower()
```

[93]:
```
rphunter_df.head()
```

[93]:
```
                                            Hidden Balance Modification  \
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                            0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                            0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                            0
0x11cbc781dadaad13fc3a361772c80b1c027820af                            0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                            0

                                            Hidden Mint/Burn  \
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 1
0x11cbc781dadaad13fc3a361772c80b1c027820af                 0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                 0
```

```
                                            Address Restrict  Amount Restrict  \
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0                0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 1                0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 0                0
0x11cbc781dadaad13fc3a361772c80b1c027820af                 1                0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                 1                0

                                            Modifiable External Call  \
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                         0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                         0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                         0
0x11cbc781dadaad13fc3a361772c80b1c027820af                         0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                         0

                                            TimeStamp Restrict  \
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                   0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                   0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                   0
0x11cbc781dadaad13fc3a361772c80b1c027820af                   0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                   0

                                            Modifiable Tax Address  \
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                       0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                       0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                       0
0x11cbc781dadaad13fc3a361772c80b1c027820af                       0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                       0

                                            Modifiable Tax Rate
Address
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                    1
0x11cbc781dadaad13fc3a361772c80b1c027820af                    0
0x3e597ea168a85aa2ae5e2c4333665bcd875ed10f                    0
```

[ ]:

```
res = requests.post(API_ENDPOINT + "/predict", json={"addresses": rphunter_df.
 ↪index.to_list()})
print("Status:", res.status_code)
print("Elapsed:", res.elapsed.total_seconds(), "seconds")
res = res.json()['results']
df = pd.DataFrame.from_dict(res, orient="index")
```

```
df.head()
```

1.7.1 Labels

[ ]:
```
label_df = pd.DataFrame.from_records(df['labels'].tolist(), index=df.index)
label_df.head()
```

```
                                            Address Restrict  Amount Restrict  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 1                1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 1                0
0x94b7d24552933f50a5a5705c446528806dcea381                 0                1
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 0                0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 0                0

                                            Hidden Balance Modification  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                            0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                            0
0x94b7d24552933f50a5a5705c446528806dcea381                            0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                            0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                            0

                                            Hidden Mint/Burn  Leak  Limit  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381                 0     0      0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 1     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 1     0      1

                                            Mint  Modifiable External Call  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1                         0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0                         0
0x94b7d24552933f50a5a5705c446528806dcea381     0                         0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0                         0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1                         0

                                            Modifiable Tax Address  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                       1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                       0
0x94b7d24552933f50a5a5705c446528806dcea381                       0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                       0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                       0

                                            Modifiable Tax Rate  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x94b7d24552933f50a5a5705c446528806dcea381                    0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                    0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                    1
```

```
                                            TimeStamp Restrict  Amount Limit  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                   1             0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                   0             0
0x94b7d24552933f50a5a5705c446528806dcea381                   0             0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                   0             0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                   0             1

                                            Exchange Permission  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x94b7d24552933f50a5a5705c446528806dcea381                    0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                    0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                    1

                                            Exchange Suspension  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                    0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                    0
0x94b7d24552933f50a5a5705c446528806dcea381                    0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                    0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                    1

                                            Fee Manipulation  \
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0
0x94b7d24552933f50a5a5705c446528806dcea381                 0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 1

                                            Invalid Callback  Trapdoor
0x93023f1d3525e273f291b6f76d2f5027a39bf302                 0         0
0x2753dce37a7edb052a77832039bcc9aa49ad8b25                 0         0
0x94b7d24552933f50a5a5705c446528806dcea381                 0         0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093                 0         0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21                 0         1
```

[ ]:
```
y_true = ground_df
y_pred = label_df.loc[y_true.index, y_true.columns]
```

[ ]:
```
y_true.head()
```

```
                                            Mint  Leak  Limit
address
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381     0     0      0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1     0      1
```

[ ]:
```
y_pred.head()
```

```
                                            Mint  Leak  Limit
address
0x93023f1d3525e273f291b6f76d2f5027a39bf302     1     0      1
0x2753dce37a7edb052a77832039bcc9aa49ad8b25     0     0      1
0x94b7d24552933f50a5a5705c446528806dcea381     0     0      0
0xe0b9d4146aad6936cbfcbe4dae47e34aab96b093     0     0      0
0x10f6f2b97f3ab29583d9d38babf2994df7220c21     1     0      1
```

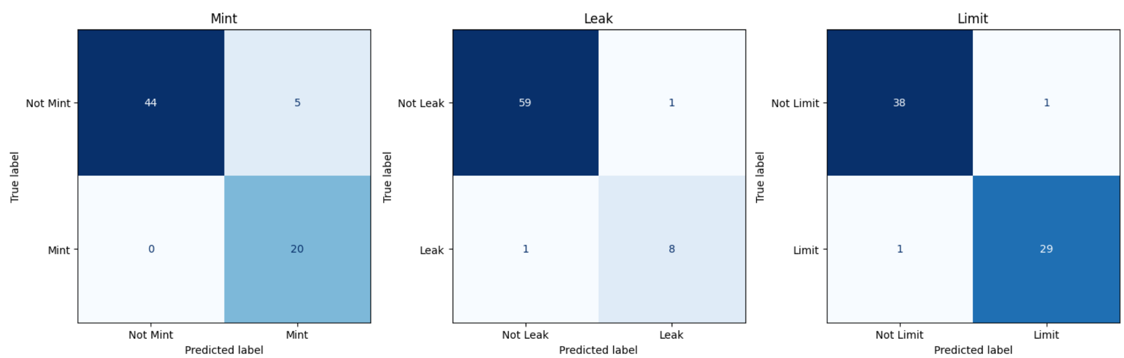
[ ]:
```
print(classification_report(
  y_true.values,
  y_pred.values,
  target_names=y_true.columns,
  zero_division=0))
```

```
              precision    recall  f1-score   support

        Mint       0.80      1.00      0.89        20
        Leak       0.89      0.89      0.89         9
       Limit       0.97      0.97      0.97        30

   micro avg       0.89      0.97      0.93        59
   macro avg       0.89      0.95      0.91        59
weighted avg       0.90      0.97      0.93        59
 samples avg       0.59      0.59      0.59        59
```

[ ]:
```
plot_confuse(y_true, y_pred)
```



1.7.2 Anomaly

[ ]:
```
anomaly_true = (y_true.astype(int).sum(axis=1) > 0).astype(int)
anomaly_pred = df.loc[y_true.index, "anomaly"].astype(int)
```

[ ]:
```
labels = ['normal', 'anomaly']
print(classification_report(
  anomaly_true,
  anomaly_pred,
  target_names=labels,
  zero_division=0))
```

```
              precision    recall  f1-score   support

      normal       0.00      0.00      0.00        27
     anomaly       0.61      1.00      0.76        42

    accuracy                           0.61        69
   macro avg       0.30      0.50      0.38        69
weighted avg       0.37      0.61      0.46        69
```

[ ]:
```
plot_confuse(anomaly_true, anomaly_pred, labels)
```