

Lab 10

Github : <https://github.com/sojirat/fintech-lab10.git>

Audit Notes : [docs/Audit_Notes.md](#)

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Run ตอนแรก แบบยังไม่ได้แกะอะไร ผลลัพธ์ไม่มี Fraud

FinTech Lab 10

Fraud Detection + AML Graph Hunt + XAI + Case Pack

UI Next.js + API: FastAPI + Dataset: CSV bundle

1) Dataset Status

Refresh Summary

Train Models

Load Top Anomalies

```
{
  "rows": 1000,
  "columns": [
    "TransactionID",
    "Amount",
    "CustomerID",
    "MerchantID",
    "FraudIndicator",
    "Category",
    "Age",
    "Address",
    "AccountBalance",
    "LastLogin",
    "MerchantName",
    "Location",
    "SuspiciousFlag"
  ],
  "fraud_rate": 0.045,
  "suspicious_customer_rate": 0.05,
  "amount_avg": 10.0001262279815,
  "amount_max": 99.08746974312738
}
```

Training Result

```
{
  "status": "trained",
  "n_rows": 1000,
  "label_fraud_rate": 0.045,
  "confusion_matrix_fraud_rate": 0.2,
  "confusion_matrix": [
    [
      235,
      4
    ],
    [
      13,
      0
    ]
  ],
  "precision": 0,
  "recall": 0,
  "f1": 0,
  "roc_auc": 0.4507417260923545,
  "note": "ElasticForest is unsupervised. LogisticRegression is used as a supervised shadow model for explanations (XAI)."
```

2) Top Anomalies (click a TransactionID)

TransactionID	Amount	ForeRisk	ShadowProbe	FraudIndicator
671	67.69	0.0033	0.5049	1
534	59.65	0.0029	0.0307	0
505	53.93	0.0022	0.5873	0
489	26.68	0.0018	0.1967	0
502	77.46	0.0013	0.0873	0
483	44.86	0.0013	0.5877	0
321	57.87	0.0013	0.0468	0
450	62.48	0.0006	0.1967	0
349	74.41	-0.0003	0.0919	0
510	46.79	-0.0002	0.1306	0
449	12.96	-0.0003	0.0483	0
504	93.50	-0.0004	0.0664	0
792	72.01	-0.0005	0.0483	0
456	10.59	-0.0008	0.0666	0
703	53.20	-0.0011	0.1371	0
923	52.16	-0.0012	0.0468	0
89	26.01	-0.0013	0.0525	0
907	61.96	-0.0015	0.1113	0
721	71.44	-0.0016	0.1016	0
148	79.52	-0.0016	0.1086	0
487	25.53	-0.0018	0.0509	0
207	81.56	-0.0018	0.0875	0
339	26.18	-0.0019	0.0209	0
799	69.45	-0.0021	0.0896	0
906	90.39	-0.0022	0.1064	0
282	46.57	-0.0023	0.0673	0
759	60.53	-0.0023	0.0717	0
262	54.47	-0.0023	0.1400	0
847	80.23	-0.0024	0.1389	0
280	16.22	-0.0024	0.0477	0

3) Selected Transaction — Score • Explain • Case Pack

Create Case Pack

TransactionID: 280

Amount: 16.2200000160605

CustomerID: 1351

MerchantID: 2022-01-10T16:00:00

MerchantID: 2553

AmountScore: 0.73160812054136

FraudIndicator: 0

Category: Retail

Name: Customer 1351

Age: 32

Address: Address 1351

AccountBalance: 665.3686368112

LastLogin: 7822-12-17

MerchantName: Merchant 2553

Location: Location 2553

SuspiciousFlag: 0

Model Outputs

```
{
  "Forest_decision_function": 0.46023080000000003,
  "Forest_risk_score": 0.46023080000000003,
  "Shadow_Model_Prob": 0.46023080000000003,
  "Shadow_Model_Prob": 0.46023080000000003
}
```

Explain (Top Factors)

```
{
  "method": "Linear contribution",
  "top_factors": [
    {
      "feature": "Amount",
      "contribution": -0.3654718832264295
    },
    {
      "feature": "Location_Location",
      "contribution": 0.2553
    },
    {
      "feature": "DaysSinceLastLogin",
      "contribution": -0.17792344229621562
    },
    {
      "feature": "AnomalyScore",
      "contribution": -0.1780397546038112
    },
    {
      "feature": "Category_Retail",
      "contribution": 0.0160357370556819
    },
    {
      "feature": "Hour",
      "contribution": -0.47986278623388823
    },
    {
      "feature": "AccountBalance",
      "contribution": 0.8130806326303743
    },
    {
      "feature": "Age",
      "contribution": -0.4267495381842937
    },
    {
      "feature": "AmountToCustomerAvg",
      "contribution": 0.002280551748399787
    },
    {
      "feature": "TxCount_3M",
      "contribution": 0
    }
  ],
  "note": "Install SHAP for more advanced explanations. This fallback is multi-framely and deterministic."
}
```

AML Graph Hunt

Graph Summary

Smurfing (Fan-out/Fan-in)

Find Cycles

```
{
  "nodes": 1282,
  "edges": 2089,
  "customers": 636,
  "merchants": 651,
  "top_degree_nodes": [
    {
      "node": "C13424",
      "degree": 12
    },
    {
      "node": "C13666",
      "degree": 12
    },
    {
      "node": "C13823",
      "degree": 12
    },
    {
      "node": "C13311",
      "degree": 10
    },
    {
      "node": "C13322",
      "degree": 10
    },
    {
      "node": "C13187",
      "degree": 10
    },
    {
      "node": "C13790",
      "degree": 8
    },
    {
      "node": "M13638",
      "degree": 8
    },
    {
      "node": "M13667",
      "degree": 8
    },
    {
      "node": "M13479",
      "degree": 8
    }
  ]
}
```

Smurfing — Fan-out

```
{
  "node": "Fanout",
  "items": [ ]
}
```

Smurfing — Fan-in

```
{
  "node": "Fanin",
  "items": [ ]
}
```

Cycles / Rings

```
{
  "max_len": 4,
  "items": [
    {
      "cycle": [
        "M1714",
        "M1848",
        "M1872",
        "C13666"
      ],
      "length": 4
    },
    {
      "cycle": [
        "M1714",
        "C13666",
        "M1872",
        "C13666"
      ],
      "length": 4
    }
  ]
}
```

Cases (Human-in-the-loop)

Refresh Case List

```
{
  "items": [
    {
      "case_id": "C1332676114",
      "created_at": "2020-02-28T11:34:12.001233Z",
      "summary": "TX 906 Fraud triage case"
    }
  ]
}
```

Classroom scaffold - Evidence-bound decisions - Human-in-the-loop

Run หลังจากปรับข้อจำกัดต่าง ๆ เช่น ปรับ Balancing, ทำ K-Fold ผลลัพธ์มี Fraud

FinTech Lab 10		L0: Next.js + API, FastAPI + Dataset, CSV bundle																																																																																																																																																										
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<div> <div>1) Dataset Status</div> <div> <div>Refresh Summary</div> <div>Train Models</div> <div>Load Top Anomalies</div> </div> <div> <pre> { "rows": 1000, "columns": ["TransactionID", "Amount", "CustomerID", "Timestamp", "MerchantID", "MerchantScore", "FraudIndicator", "Category", "Age", "Address", "AccountBalance", "LastLogin", "MerchantName", "Location", "SuspiciousFlag"], "fraud_rate": 0.005, "imbalanced_customer_rate": 0.025, "amount_min": 10, "amount_max": 99.99999999999999, "cv_fold": 5, "test_confusion_matrix": { 0, 1 }, "cv_precision": 0.9999999999999999, "test_precision": 0.9999999999999999, "test_recall": 0.9999999999999999, "cv_f1": 0.9999999999999999, "test_f1": 0.9999999999999999, "test_confusion_matrix": { 0, 1 }, "cv_precision": 0.9999999999999999, "test_precision": 0.9999999999999999, "test_recall": 0.9999999999999999, "cv_f1": 0.9999999999999999, "test_f1": 0.9999999999999999, "test_confusion_matrix": { 0, 1 } } </pre> </div> </div>	<div> <div>AML Graph Hunt</div> <div> <div>Graph Summary</div> <div>Smurfing (Fan-out/Fan-in)</div> <div>Find Cycles</div> </div> <div> <pre> { "nodes": 1207, "edges": 836, "customer": 631, "top_degree_nodes": [{ "node": "C1424", "degree": 12 }, { "node": "C1466", "degree": 12 }, { "node": "C1523", "degree": 12 }, { "node": "C1331", "degree": 10 }, { "node": "C1322", "degree": 10 }, { "node": "C1618", "degree": 10 }, { "node": "C1790", "degree": 8 }, { "node": "M2638", "degree": 8 }, { "node": "M2807", "degree": 8 }, { "node": "M2479", "degree": 8 }] } </pre> </div> </div>	<div> <div>Smurfing — Fan-out</div> <div> <div>Nodes: 1</div> <div>Items: 1</div> </div> <div> <pre> { "node": "Fanout", "items": [{ "node": "Fanin", "items": [{ "max_len": 6, "item": 1 }, { "cycle": [{ "C1466", "M2734", "M2872"], "length": 4 }, { } }, { "cycle": [{ "C1466", "M2872", "C1466"], "length": 4 }, { } }] }] } </pre> </div> </div>	<div> <div>Cycles / Rings</div> <div> <div>max_len: 6</div> <div>item: 1</div> </div> <div> <pre> { "cycle": [{ "C1466", "M2734", "M2872" }, "length": 4], { } } </pre> </div> </div> <div> <div>Cases (Human-in-the-loop)</div> <div> <div>Refresh Case List</div> </div> <div> <pre> { "cases": [{ "case_id": "2153208761114", "created_at": "2020-02-18T11:04:15.011Z", "summary": "TX 980 fraud ring case" }] } </pre> </div> </div>																																																																																																																																																									
<div> <div>2) Top Anomalies (click a TransactionID)</div> </div> <div> <table> <thead> <tr> <th>TransactionID</th><th>Amount</th><th>Foresthk</th><th>ShadowProbe</th><th>FraudIndicator</th></tr> </thead> <tbody> <tr><td>61</td><td>42.08</td><td>0.0016</td><td>0.2760</td><td>0</td></tr> <tr><td>10</td><td>12.25</td><td>0.0006</td><td>0.2160</td><td>0</td></tr> <tr><td>376</td><td>26.14</td><td>0.0000</td><td>0.1915</td><td>0</td></tr> <tr><td>366</td><td>38.32</td><td>-0.0004</td><td>0.4005</td><td>0</td></tr> <tr><td>734</td><td>16.27</td><td>-0.0004</td><td>0.8247</td><td>1</td></tr> <tr><td>102</td><td>61.66</td><td>-0.0006</td><td>0.4189</td><td>0</td></tr> <tr><td>676</td><td>67.05</td><td>-0.0006</td><td>0.3024</td><td>0</td></tr> <tr><td>112</td><td>40.48</td><td>-0.0007</td><td>0.2127</td><td>0</td></tr> <tr><td>27</td><td>20.49</td><td>-0.0007</td><td>0.1819</td><td>0</td></tr> <tr><td>449</td><td>12.95</td><td>-0.0011</td><td>0.2695</td><td>0</td></tr> <tr><td>877</td><td>77.26</td><td>-0.0013</td><td>0.2115</td><td>0</td></tr> <tr><td>564</td><td>90.15</td><td>-0.0014</td><td>0.4068</td><td>0</td></tr> <tr><td>417</td><td>84.73</td><td>-0.0016</td><td>0.3259</td><td>0</td></tr> <tr><td>763</td><td>72.96</td><td>-0.0016</td><td>0.2192</td><td>0</td></tr> <tr><td>166</td><td>16.56</td><td>-0.0017</td><td>0.2314</td><td>0</td></tr> <tr><td>647</td><td>80.23</td><td>-0.0017</td><td>0.4992</td><td>0</td></tr> <tr><td>189</td><td>76.85</td><td>-0.0019</td><td>0.2241</td><td>0</td></tr> <tr><td>632</td><td>79.37</td><td>-0.0019</td><td>0.2832</td><td>0</td></tr> <tr><td>680</td><td>63.54</td><td>-0.0020</td><td>0.2619</td><td>0</td></tr> <tr><td>78</td><td>66.14</td><td>-0.0020</td><td>0.4128</td><td>0</td></tr> <tr><td>84</td><td>22.97</td><td>-0.0021</td><td>0.2368</td><td>0</td></tr> <tr><td>479</td><td>40.10</td><td>-0.0022</td><td>0.1871</td><td>0</td></tr> <tr><td>206</td><td>64.57</td><td>-0.0023</td><td>0.2266</td><td>0</td></tr> <tr><td>749</td><td>62.11</td><td>-0.0023</td><td>0.2922</td><td>0</td></tr> <tr><td>484</td><td>21.09</td><td>-0.0026</td><td>0.2532</td><td>0</td></tr> <tr><td>795</td><td>91.23</td><td>-0.0026</td><td>0.4932</td><td>0</td></tr> <tr><td>844</td><td>35.86</td><td>-0.0026</td><td>0.2996</td><td>0</td></tr> <tr><td>348</td><td>66.46</td><td>-0.0028</td><td>0.3078</td><td>0</td></tr> <tr><td>930</td><td>19.53</td><td>-0.0029</td><td>0.2545</td><td>0</td></tr> <tr><td>379</td><td>95.69</td><td>-0.0029</td><td>0.2838</td><td>0</td></tr> </tbody> </table> </div>	TransactionID	Amount	Foresthk	ShadowProbe	FraudIndicator	61	42.08	0.0016	0.2760	0	10	12.25	0.0006	0.2160	0	376	26.14	0.0000	0.1915	0	366	38.32	-0.0004	0.4005	0	734	16.27	-0.0004	0.8247	1	102	61.66	-0.0006	0.4189	0	676	67.05	-0.0006	0.3024	0	112	40.48	-0.0007	0.2127	0	27	20.49	-0.0007	0.1819	0	449	12.95	-0.0011	0.2695	0	877	77.26	-0.0013	0.2115	0	564	90.15	-0.0014	0.4068	0	417	84.73	-0.0016	0.3259	0	763	72.96	-0.0016	0.2192	0	166	16.56	-0.0017	0.2314	0	647	80.23	-0.0017	0.4992	0	189	76.85	-0.0019	0.2241	0	632	79.37	-0.0019	0.2832	0	680	63.54	-0.0020	0.2619	0	78	66.14	-0.0020	0.4128	0	84	22.97	-0.0021	0.2368	0	479	40.10	-0.0022	0.1871	0	206	64.57	-0.0023	0.2266	0	749	62.11	-0.0023	0.2922	0	484	21.09	-0.0026	0.2532	0	795	91.23	-0.0026	0.4932	0	844	35.86	-0.0026	0.2996	0	348	66.46	-0.0028	0.3078	0	930	19.53	-0.0029	0.2545	0	379	95.69	-0.0029	0.2838	0	<div> <div>3) Selected Transaction — Score + Explain + Case Pack</div> <div> <div>Open Case Pack</div> </div> <div> <div>Transaction</div> <pre> { "TransactionID": 734, "Amount": 16.2661513381182, "CustomerID": 1915, "Timestamp": "2020-01-31T13:00:00", "MerchantID": 2036, "MerchantScore": 0.594634853631567, "FraudIndicator": 1, "Category": "Travel", "Age": "Customer 2479", "Age": 54, "Address": "Address 1970", "AccountBalance": 2417.248388545462, "LastLogin": "2020-09-02", "MerchantName": "Merchant 2879", "Location": "Location 2079", "SuspiciousFlag": 0 } </pre> </div> <div> <div>Model Outputs</div> <pre> { "inforest_decision_function": 0.4883283827448875, "inforest_film_score": -0.000303030303030303, "shadow_model_prob": 1, "shadow_model_prob": 0.824761164237563 } </pre> </div> <div> <div>Explain (Top Factors)</div> <pre> { "method": "shap_magnitude", "top_factors": [{ "feature": "Amount", "contribution": -1.5617281927216871 }, { "feature": "DayOfWeek", "contribution": -3.47610888844461 }, { "feature": "DaysSinceLastLogin", "contribution": -1.438488473737371 }, { "feature": "AccountBalance", "contribution": -1.3902633822813335 }, { "feature": "AnomalyScore", "contribution": -1.0815439108362617 },</pre></div></div>
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