IOT Security Gateway

Intrusion Detection In IOT Nets

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How detection is done?
Methods and Models
Results
References
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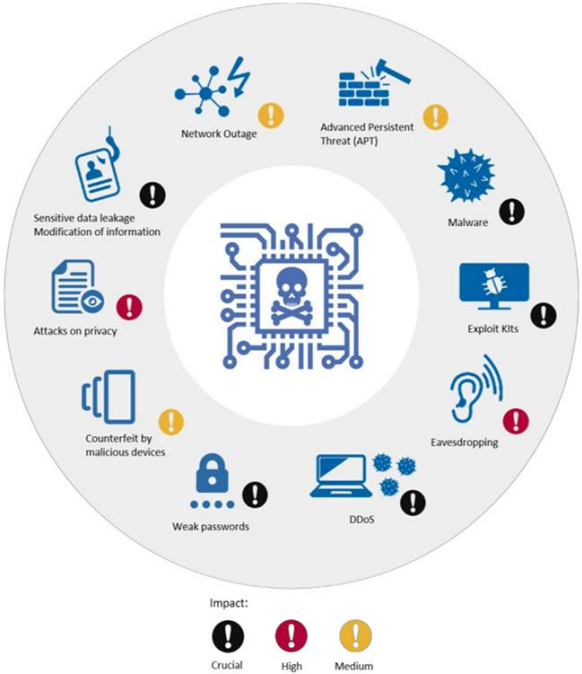
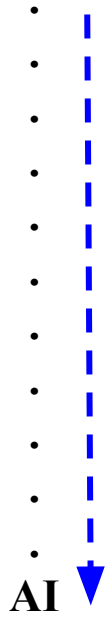
How detection is done?

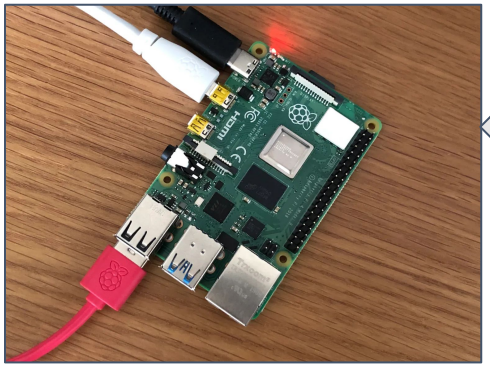


[1]

- **Heuristic Analysis**
- **Signature-Based Detection**



Real and Infected IOT Devices



[6]

[6]

3 Real IOT Devices : [4]

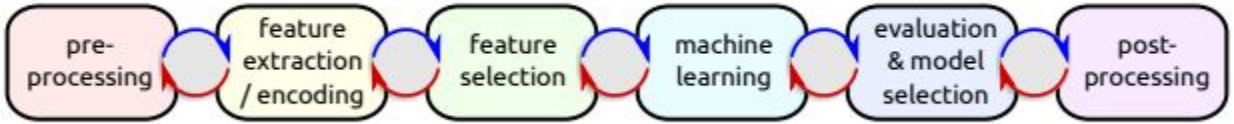
- Philips HUE smart LED lamp
- Amazon Echo home intelligent personal assistant
- Somfy smart doorlock

[4]

[4]

[4]

ML design cycle



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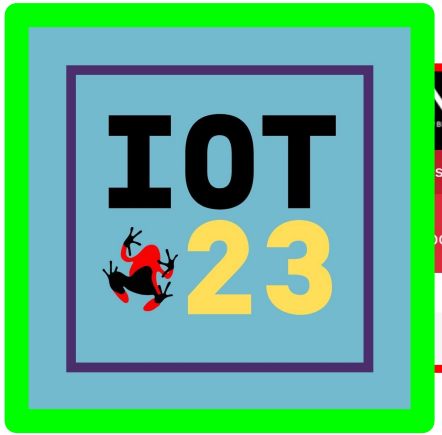
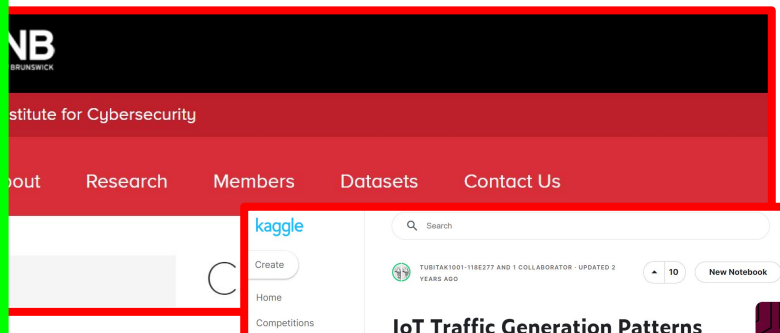
Dataset Selection



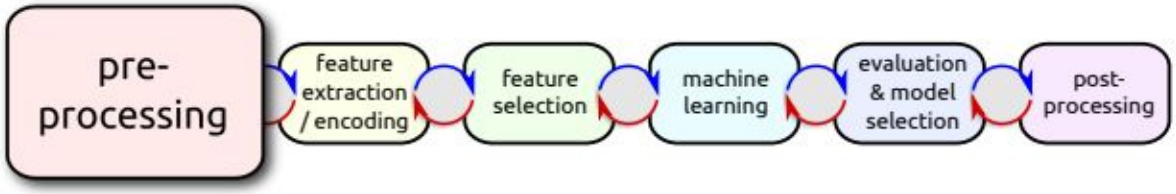
[4]



[2]

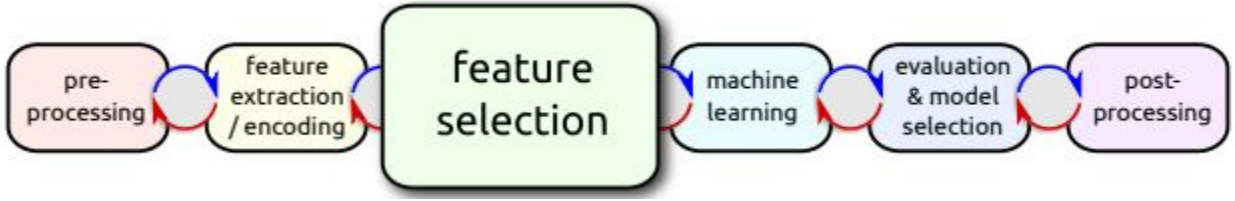
[3]

Pre-processing




```
In [5]: df_c.loc[(df_c.label == '-   Malicious   PartOfAHorizontalPortScan'), 'label'] = 'PartOfAHorizontalPortScan'
        df_c.loc[(df_c.label == '(empty)   Malicious   PartOfAHorizontalPortScan'), 'label'] = 'PartOfAHorizontalPortScan'
        df_c.loc[(df_c.label == '-   Malicious   Okiru'), 'label'] = 'Okiru'
        df_c.loc[(df_c.label == '(empty)   Malicious   Okiru'), 'label'] = 'Okiru'
        df_c.loc[(df_c.label == '-   Benign   -'), 'label'] = 'Benign'
        df_c.loc[(df_c.label == '(empty)   Benign   -'), 'label'] = 'Benign'
        df_c.loc[(df_c.label == '-   Malicious   DDoS'), 'label'] = 'DDoS'
```

Feature selection




```
In [15]: X = df_c[['duration', 'orig_bytes', 'resp_bytes', 'missed_bytes', 'orig_pkts', 'orig_ip_bytes', 'resp_pkts', '
         Y = df_c['label']
```

```
In [7]: df_c = df_c.drop(columns=['ts','uid','id.orig_h','id.orig_p','id.resp_h','id.resp_p', 'service','local_orig','local_resp
```

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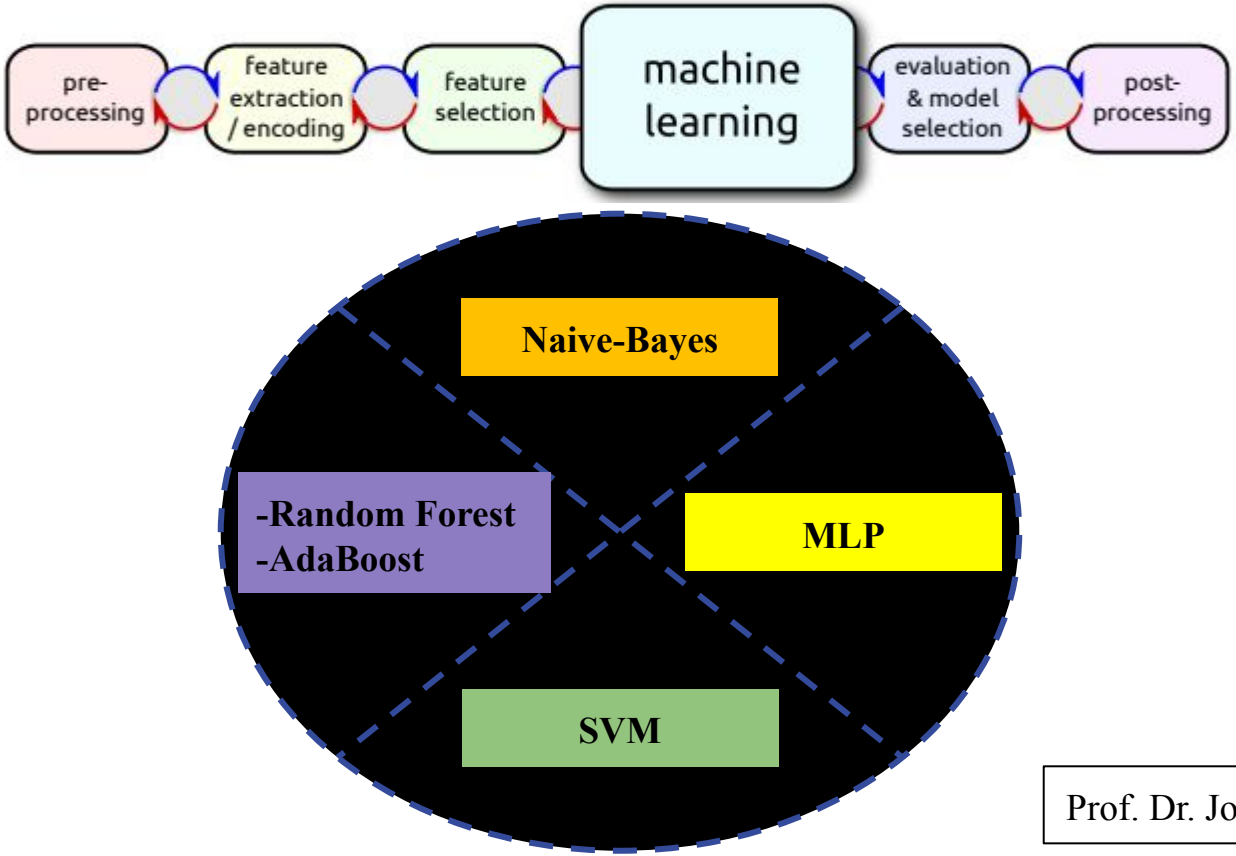
Label overview

	Label	Count
0	PartOfAHorizontalPortScan	446797
1	DDoS	213243
2	Benign	165620
3	Okiru	99675
4	C&C	15058
5	Attack	3916
6	C&C-HeartBeat	308
7	C&C-Torii	30
8	C&C-FileDownload	20
9	FileDownload	13
10	C&C-HeartBeat-FileDownload	8

Models



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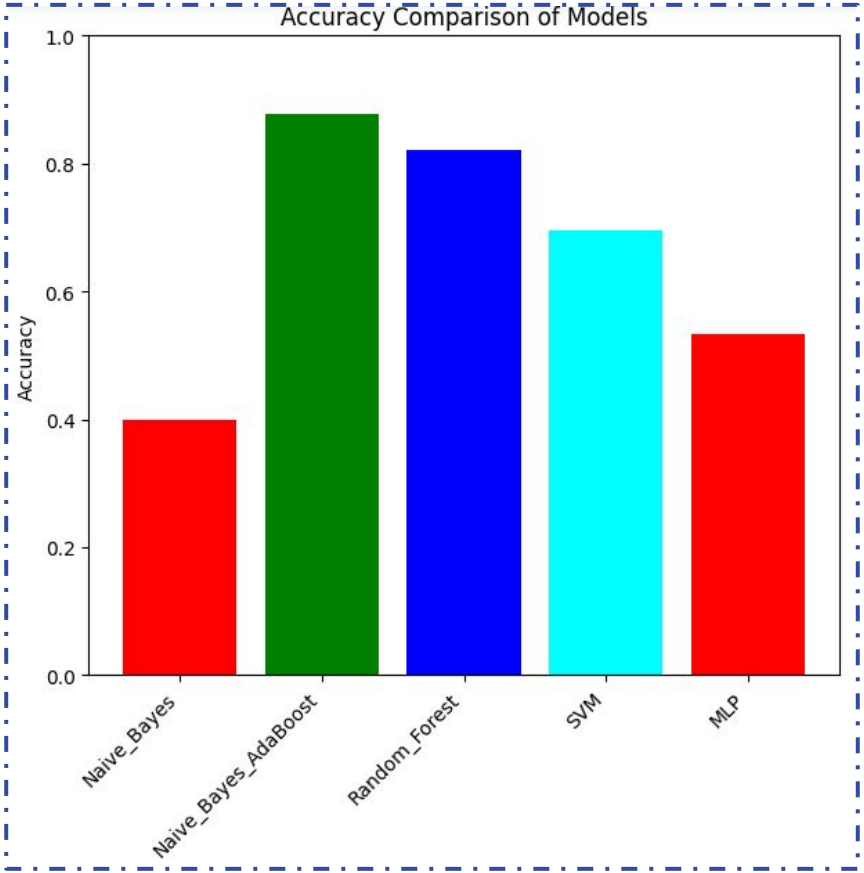
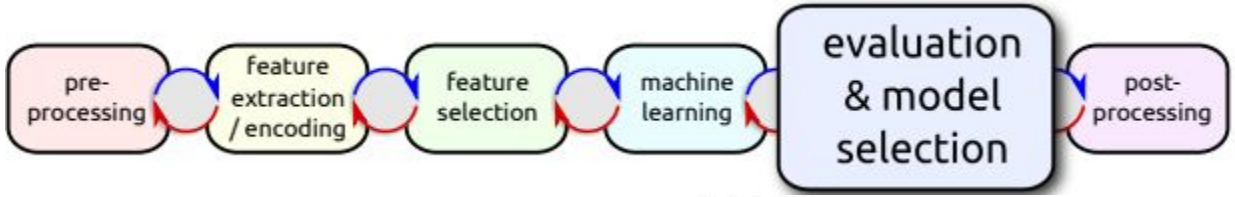
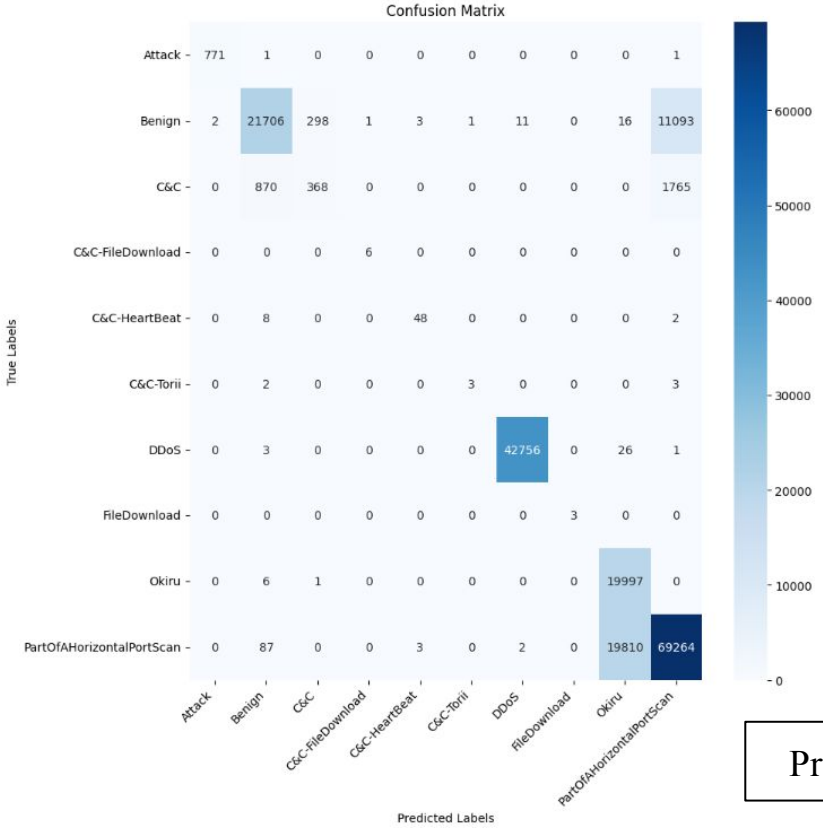
Accuracy and confusion matrix





	Class	Percentage Correct
0	0	0.997413
1	1	0.655730
2	2	0.121878
3	3	1.000000
4	4	0.827586
5	5	0.375000
6	6	0.999299
7	7	1.000000
8	8	0.999650
9	9	0.776798



Random-Forest

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