Machine Learning

Assignment #4

Predictive Maintenance by SVM

Paper Presentation

- 論文清單: [授課教材]-[Paper Presentation]-Paper.zip
- 報告時間: 6/7、6/14
- 報告方式
  - 每四人為一組 (此分組亦為Final Project分組)
  - 每組12分鐘報告、3分鐘問答
- 報告登記
  - E-Course討論區登記報告日期、順序、組別成員、論文名稱
  - 5/29(二)13:00開放E-Course討論區登記，First Come First Serve!
- 報告當天請印出一份論文紙本給老師

Predictive Maintenance

- Predictive maintenance techniques are designed to help anticipate equipment failures to allow for advance scheduling of corrective maintenance, thereby preventing unexpected equipment downtime, improving service quality for customers, and also reducing the additional cost caused by over-maintenance in preventative maintenance policies.
- Many types of equipment—e.g., automated teller machines (ATMs), information technology equipment, medical devices, etc.—track run-time status by generating system messages, error events, and log files, which can be used to predict impending failures.

Data Description

- Observation Window/ Prediction Window
  - Different data-sets with different Observation- and Prediction-Window sizes are provided:
    - OW: [1, 2, 4, 8, 16] days;
    - PW: [1, 2] days.
- Feature (27 types of errors in total)
  - 26 frequent errors have been selected to be relevant, these errors are represented by their Error ID;
  - All other (infrequent) relevant errors are grouped as rare errors. They are grouped under Error ID 1;
  - For each error, three different statistic has been provided:
    - The amount of errors;
    - The mean interval of the errors (vMean);
    - The standard deviation of the interval of the errors (vStd).
- Label
  - FALSE: the machine is OK in that day;
  - TRUE: machine break down for some reasons in that day.

Predictive Maintenance by SVM

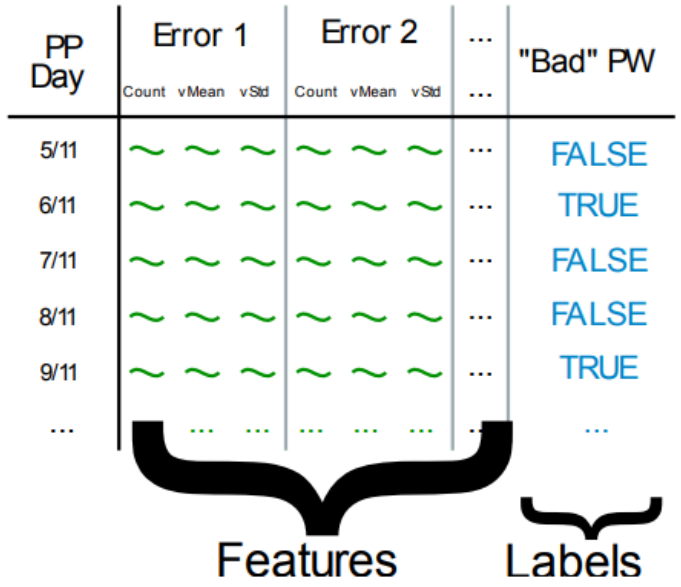
Feature

1. Count: The amount of errors
2. vMean: The mean interval of the errors
3. vStd: The standard deviation of the interval of the errors

Label

False: the machine is OK in that day

True: machine break down for some reasons in that day



	A	B	C	D	E	F	G	H	I	J	K	L	M
1			1	1	1	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08
2			count	vMean	vStd	count	vMean	vStd	count	vMean	vStd	count	vMean
3	Machine	Date											
4	M040_A1	2015/5/30	11	7850.549	9407.844								
5	M040_A1	2015/5/31											
6	M040_A1	2015/6/1											
7	M040_A1	2015/6/2											
8	M040_A1	2015/6/3											
9	M040_A1	2015/6/4											
10	M040_A1	2015/6/5											
11	M040_A1	2015/6/6	6	8193.567	16356.36								
12	M040_A1	2015/6/7											
13	M040_A1	2015/6/8											
14	M040_A1	2015/6/9	1										
15	M040_A1	2015/6/10											

CC	CD	CE	CF
1.37E+08	1.37E+08	1.37E+08	Label
count	vMean	vStd	
			FALSE
			TRUE
			FALSE
			FALSE
			TRUE
			FALSE
			FALSE

Prediction Results

- submission_sample.csv
- Your submission is probability of failure from your model
- **submission format:**
  - 5 datasets have different label size.(due to different OW size)
  - 個別上傳OW=1、2、4、8、16, PW=1和OW=1、2、4、8、16, PW=2的預測結果

	A	B	C
1	id	Label	
2	M066_A1-4/6/2015	0.5	
3	M066_A1-5/6/2015	0.5	
4	M066_A1-6/6/2015	0.5	
5	M066_A1-7/6/2015	0.5	
6	M066_A1-8/6/2015	0.5	
7	M066_A1-9/6/2015	0.5	
8	M066_A1-10/6/2015	0.5	
9	M066_A1-11/6/2015	0.5	
10	M066_A1-12/6/2015	0.5	
11	M066_A1-13/6/2015	0.5	
12	M066_A1-14/6/2015	0.5	
13	M066_A1-15/6/2015	0.5	
14	M066_A1-16/6/2015	0.5	
15	M066_A1-17/6/2015	0.5	
16	M066_A1-18/6/2015	0.5	
17	M066_A1-19/6/2015	0.5	
18	M066_A1-20/6/2015	0.5	
19	M066_A1-21/6/2015	0.5	
20	M066_A1-22/6/2015	0.5	

The Dataset of Predictive Maintenance

- Dataset can be downloaded at:
  - Nexperia Predictive Maintenance Full 1
    - https://www.kaggle.com/c/nexperia-predictive-maintenance-full-1/data
  - Nexperia Predictive Maintenance Full 2
    - https://www.kaggle.com/c/nexperia-predictive-maintenance-full-2

Assignment #4

1. Download SVM Tools.
   - https://www.csie.ntu.edu.tw/~cjlin/libsvm/
2. Study functions and parameter settings of SVM
3. Train your model on Predictive Maintenance Dataset.
4. Upload your testing results (.csv) to E-Course:
5. Submit **two text files** and your **code** to E-Course
   - Readme – How to run your code
   - Report
     - Method description & parameter settings
     - Experimental results – accuracy for different ow & pw
     - Discussion of difficulty or problem encountered
6. Deadline: 05/30(Wed) 11:59p.m