Dynamic weighted majority

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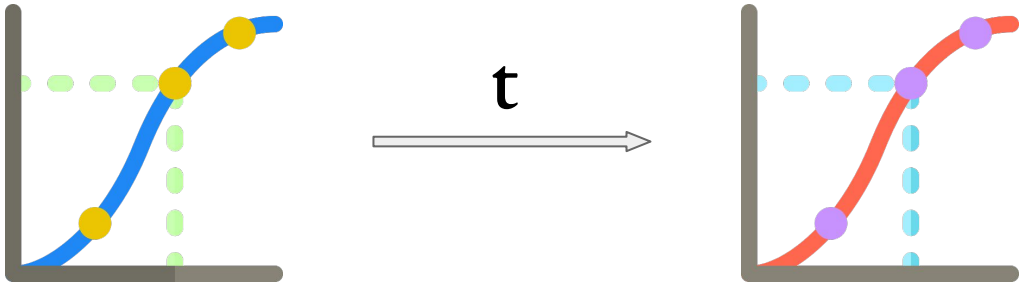
Concept drift



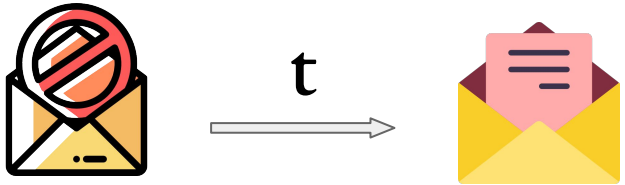
¡Data changes over the time!

Concept drift

- Weather data

Summer	Winter
15 ºC	15 ºC

- Email relevance



➢ 2 artificial datasets: **STAGGER** and **SEA**

DWM algorithm

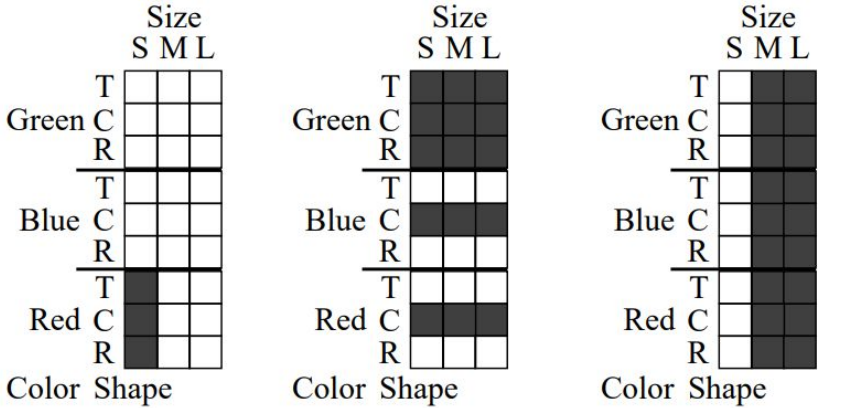
- Weighted ensemble classifier
- Online learners
  - Naive Bayes...

- β: Weight scaling factor
- θ: Weight threshold
- P

DWM algorithm

1. Train first learner
2. Predict input sample
3. Update weights
4. Normalize weights
5. Remove learners (if necessary)
6. If global prediction wrong: Add new Learner
7. Train learners with input sample
8. Repeat from 2

STAGGER concepts



Stagger dataset

- 3 attributes
- 2 labels (1 or 0)
- 3 concepts

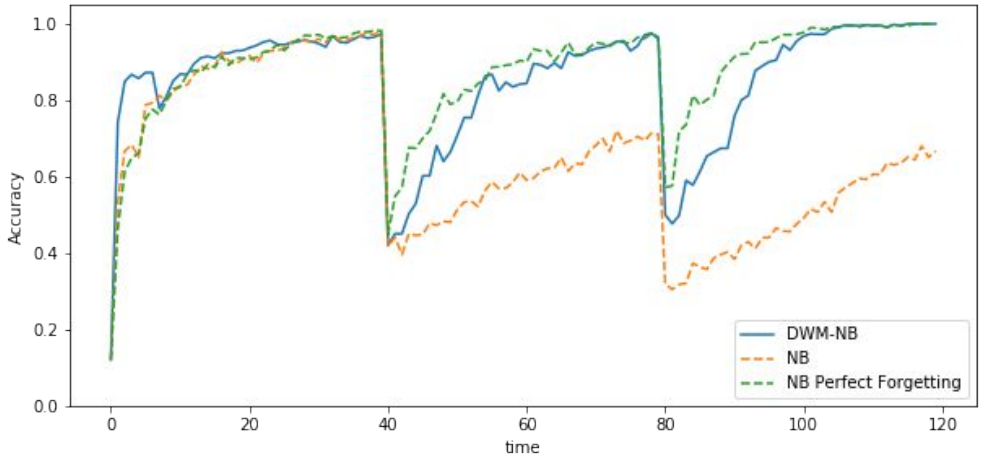
Processing

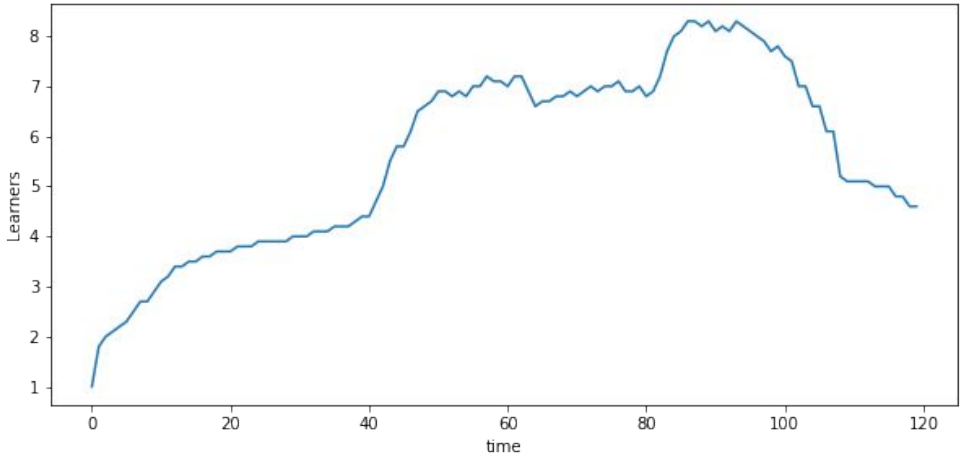
- One hot encode attributes
- 120 samples for streaming (40 samples per concept)
- Use of Bernoulli NB classifier

STAGGER evaluation

- DWM model
- NB Perfect forgetting (Perfect case)
- Standard NB

¡ Averaging results 10 times !





SEA concepts

$X1 = [0,10]$ $X2 = [0,10]$ $X3 = [0,10]$

$X1 + X2 > 8$ ⟹

$X1 + X2 > 9$ ⟹

$X1 + X2 > 7.5$ ⟹

$X1 + X2 > 9.5$ ⟹

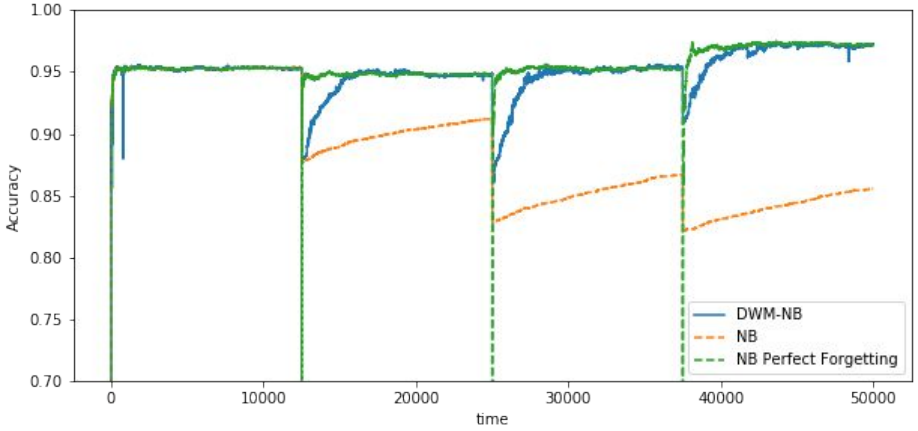
Stagger dataset

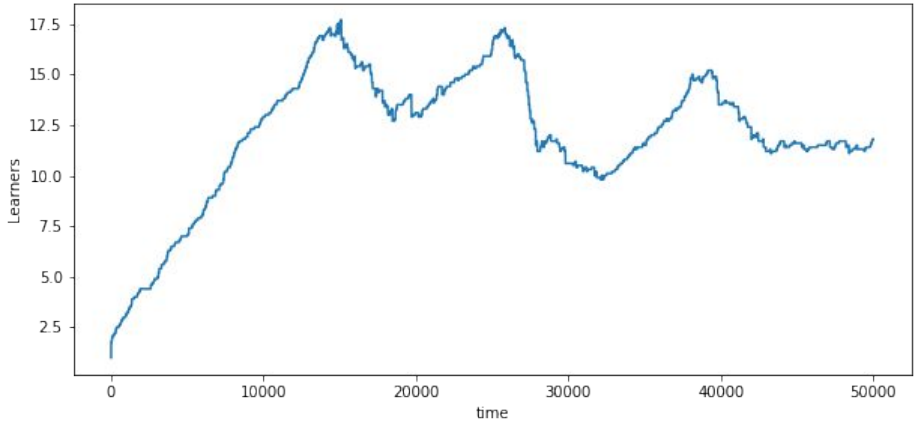
- 3 continuous attributes (1 irrelevant)
- 2 labels (1 or 0)
- 4 concepts

Processing

- One test-set for each concept
- 50000 samples for streaming (12500 samples per concept)
- Use of Gaussian NB classifier

SEA evaluation

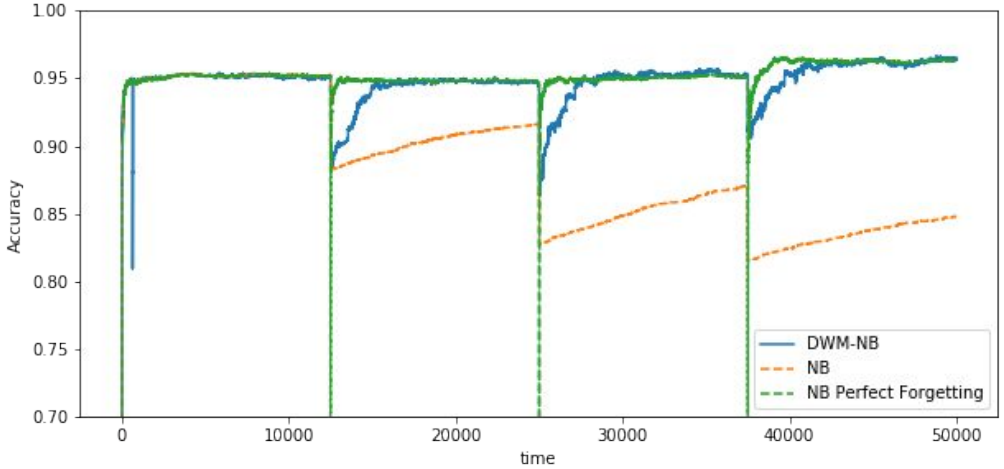


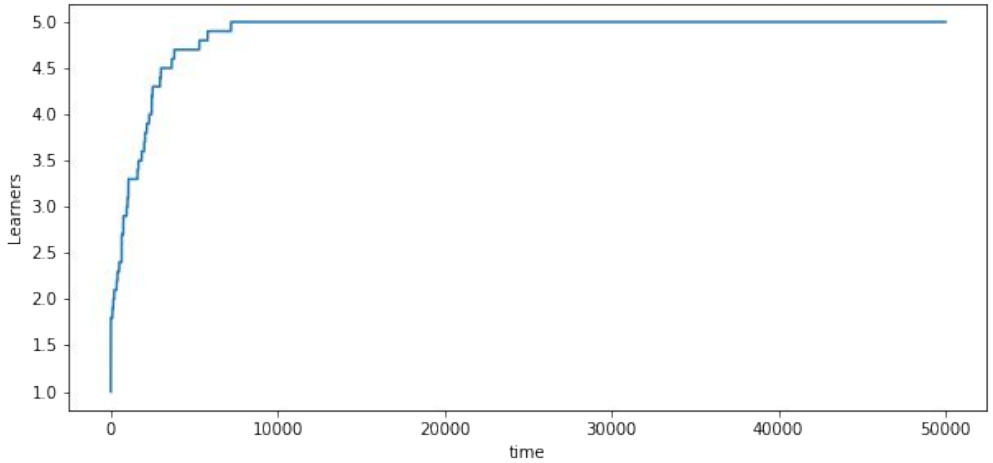


SEA evaluation

- Parameter k: Maximum number of learners
  - Faster computation
  - Similar performance

K = 5





DEMO TIME!

Questions?