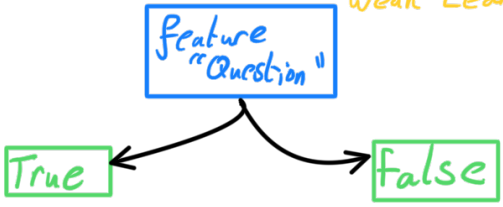
Ada Boost

3 main concepts:

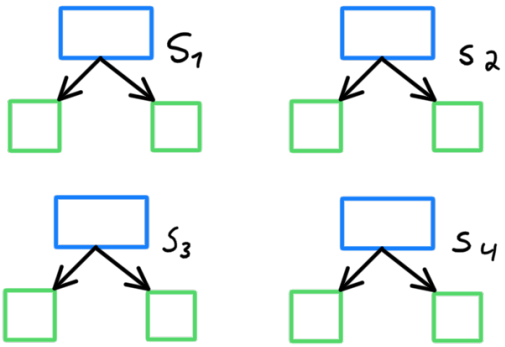
- Trees are just a node and two Leaves (Stumps)
  ⇒ Really a forest of stumps

Ada Boost
Likes weak Learners

weak Learners

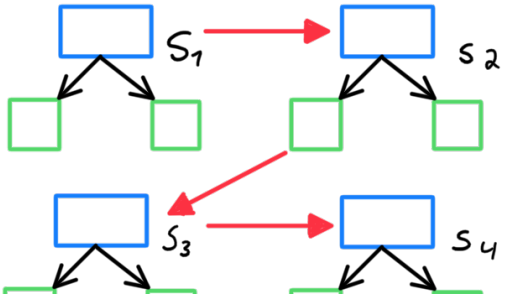


- In an Ada Boost forest of Stumps Stumps have weights.



⇒ $W_1 \cdot S_1 \oplus W_2 \cdot S_2 \oplus W_3 \cdot S_3 \oplus W_4 S_4$
where $\oplus$ is comparison method.
And $\vec{W}$ is the weight vector

- Order of Stump creation is Important
  ↳ Errors of Stumps Impact Next Stump



How to create a forest of Stumps with AdaBoost

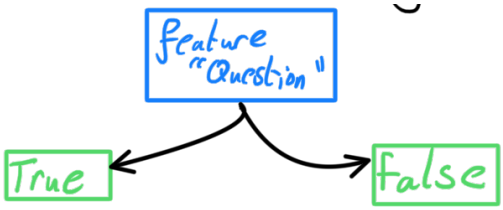
Given $F_{x,y}$ where F_{i,x_j} represents the j^{th} element of the i^{th} feature
y_j represents the j^{th} Response

we have a $\vec{W}_s$ which is the Sample weight which indicates how important it is that each Sample is Classified.
at the start each weight is $1/N$

To find first Stump we find the best feature which classifies Samples
↳ Node Impurity
find Stump weight.
↳ Stump Total Error = $\sum_i^N \text{match}(y_i, \hat{y}_i) * w_i$
↳ weight = $\frac{1}{2} \log\left(\frac{1-STE}{STE}\right)$

Modify weights

- Modify Incorrectly Classified samples
  ↳ $w_i \cdot e^{s_i^w}$
- Modify Correctly Classified Samples
  ↳ $w_i \cdot e^{-1 \cdot s_i^w}$
- Normalize new weights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