**CPT\_S 580 HW3**

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1. Since the happening of the mistake is depends on the if there is a mistake on the previous decision step. We can conduct the following:

At step 1 there are epsilon \* T mistakes

Step2 there are epsilon \* (T-1) mistakes

…

StepsT there are epsilon \* 1 mistakes

In total, there are epsilon \* (T + (T-1) + (T-2) + .. + 1) mistakes

Therefore the total number of mistakes grows quadratically O(epsilon \* T2)

1. Input: D = Training examples

Initialization: Lforward = {L0, …, Ln-1} for n search steps, Lexact = Lagg = {},

for iter from 0 to s:

Hiter = beta\* H\* + (1-beta)\* H\_hatiter

HAiter = beta\* H\* + (1-beta)\* HA\_hatiter

HSEARN\_iter = (iter == 0)? H\* : beta\*H\_hatiter + (1-beta)\* HSEARN\_iter-1

for each training example di in D:

for each search step tj in di:

compute classification example a = (fn,yn)

do exploration from tj to tj+1

compute the cost from tj+1 to tlast

generate example b = (fn, yn, cost)

add b to Lagg

if iter == 0:

add a to Lexact

else:

add a to Lexact if H\*(fn)!= Hiter(fn)

add a to Lj

H\_hatiter = **Classifier\_Learner(**Lexact**)**

HA\_hatiter = **Classifier\_Learner(**Lagg**)**

H\_Forward = **Classifier\_Learner(**Lforward**)**

**Exact Imitation: return** H\_hat0

**Forward Training: return classifier set** Lforward

**SEARN: return current H\_hatiter**

**DAgger: return the best H\_hatiter**

**AggreVaTe: return the best HA\_hatiter**

1. **Method 1**: Apply active learning, that is manually recover the missing labels.

**Method 2**: Removes the missing steps, for example if the training example with the labels (a, b, c, d, ?, f), covert the labels into (a, b, c, d, f) by removing the missing one

**Method 3**: Regenerate the training example with all the possible actions. For example, replace labels (a, b, ?) with {(a, b, a), (a, b, b), …, (a, b, z)}

1. (a)

Classifier settings: weka.function.MultilayerPerceptron Learning Rate 0.01, hide layer 0, iteration 50

Nettalk testing Recurrent error: 0.243

Nettalk testing oracle error: 0.197

Ocr testing Recurrent error: 0.245

Ocr testing oracle error: 0.212

(b)