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Assignment 0 – CS 271

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1.a

We need to use a discreate hil climb on parameter space represented by A, B and π. First of all, we need to have a given observation sequence and a parameter N donote for number states in the model. Next step is initilize the set of Λ = (A, B, π). We can give it a guess or do a ramdom number such as π = 1/N… and follow the row stochasitic condition. Next, we will go to compute step which is compute alpha ( for matrix A), beta (for matrix B), Yt(i) (the maximize probability between alpha and beta) and Yt(I,j) (probability to hidden state i to hidden state j). After that we will re-estimate the model using Baum-Welch re-estimate algorithm. If P(O | Λ ) increases, we need to go back to compute step. Finally, by trainning we can find the “best” number states in the model then score the sequence of observation verse the model we trained. The high score means similar to training data, verse.

1.b

To score a sequence by trained HMM, we can use forward algorithm. Within respect of model λ = (A, B, π) , we will find the first alpha at t = 0 with π then sum all alpha to N -1. The high score means similar to trainned data.

1.c

Dynamic program (DP) is forward algorithsm with “SUM” is replaced by “MAX” which means for each path, it will choose the maximum probability. There will be underflow with DP because DP can choose the “path” which impossible have probability equals zero. While DP give the “best” path, HMM can maximize expected number of correct states.

1.d

We need to scale value of matrces when we training a HMM because of avoiding the underflow.

2. a

According to the article “Models will run the world”, Steven and Matthew Granade informed the big impact from some famous hi-tech companies on economic, agirculture, services from using model to collect data from user, improve itself for fullfil its purposes. There are some compare/constrast and listing some example how those companies using the model to compete their competitor. Also, frome each field named, there will be some companies become more model driven which create a new disciplince of model management. Because the goal is a flywheel and “cake” will be more potential competitors in the battle, the competion will have some dark effect such as new ethical and compliance since data will be more and more precious. Finally, he also predicts the model-driven businiess will be conquest the next few years.

2.b

I totally agreed that model-driven businees will be the most trending for the next few years. I live in the Bay area where I can feel the heat of hi-tech companies. There a lot of examples of how some start-up companies became famous and expanded their arms, and also there is not a few of local companies in the same field went bankrupt. The key of sucessful is getting more customers and improves their model business because software and hardware are improves really fast. Throught the article, I wonder on the idea that “If software ate the world, models will run it”. In my aspect, models will be very impotant and will have a big role on the future but there also some factors can distribute on how it run. There is a funny sample of President Trump who wants to ban tic-tock, an application on mobiles for sharing videos. The politic will give a very big impact on how fast the model can run, even survive. There one more example, Uber and Lyft are famous side-services companies giving hails, right now facing on the threate to shup down their business.

REFERENCES

1. M. Stamp, “A revealing introduction to hidden Markov models.”
2. Steven A.Cohen and Matthew W.Granade, “Models will run the world”