Dobry kanal: <https://www.youtube.com/@alicexigao> <https://www.youtube.com/@binodsuman/playlists>

Filtering and hidden markovian- <https://www.youtube.com/watch?v=Cng3tuJ5qcg>

Smoothing and hidden markovian- <https://www.youtube.com/watch?v=A-gTxz-CrsE>

Mean square error: <https://www.youtube.com/watch?v=Z-kIJYOrUWw&t=2s>

Bayes classifier: <https://www.youtube.com/watch?v=jS1CKhALUBQ&t=659s>

Bayes sampling + weighting: <https://www.youtube.com/watch?v=u5-MpfZV8DY>

Sampling in bayes nets <https://www.youtube.com/watch?v=iz7Kl2gcmlk&t=89s>

Bayes net- <https://www.youtube.com/watch?v=JS8vDX89w7Y>

Reject sampling- <https://www.youtube.com/watch?v=OXDqjdVVePY> je to viac do detailov dolezity je zaver

Game theory: <https://www.youtube.com/watch?v=A0sR5pz69IE&t=300s>

Game theory: <https://www.youtube.com/watch?v=vex8HiuPek4>

Hidden Markov state- <https://www.youtube.com/watch?v=fX5bYmnHqqE>

Bayes net- <https://www.youtube.com/watch?v=hEZjPZ-Ze0A&t=322s>

<http://repo.darmajaya.ac.id/3800/1/Artificial%20Intelligence%20A%20Modern%20Approach%20%283rd%20Edition%29.pdf%20%28%20PDFDrive%20%29.pdf>

Procedure rule: <https://www.hackerearth.com/practice/machine-learning/prerequisites-of-machine-learning/bayes-rules-conditional-probability-chain-rule/tutorial/>

Dolezite video k bayes: <https://www.youtube.com/watch?v=evQUrkXNAPg>

Log log plot: <https://www.youtube.com/watch?v=5AUgp5N6a48>

UCB- <https://www.youtube.com/watch?v=yPUN3fWtYdA>

Smoothing markovian process: <https://www.cs.toronto.edu/~axgao/cs486686_f21/lecture_notes/Lecture_15_on_Hidden_Markov_Models_2.pdf>

To calculate the probability that it rained on day 0 (S\_0 = R) given that O\_0 = t and O\_1 = t, we can use HMM smoothing calculations.

Let's denote R as rain and ~R as no rain, and U as carrying an umbrella and ~U as not carrying an umbrella.

The quantities provided from the umbrella story are:

* P(S\_0) = 0.5: The prior probability of S\_0, which represents the probability of rain on day 0.
* P(O\_t | S\_t) = 0.9: The probability of observing t given that it is raining (S\_t = R).
* P(O\_t | neg. S\_t) = 0.2: The probability of observing t given that it is not raining (S\_t = ~R).
* P(S\_t | S\_(t-1)) = 0.7: The transition probability of rain on day t given that it rained on the previous day (S\_(t-1) = R).
* P(S\_t | neg. S\_(t-1)) = 0.3: The transition probability of rain on day t given that it did not rain on the previous day (S\_(t-1) = ~R).

To calculate the probability that it rained on day 0 (S\_0 = R) given O\_0 = t and O\_1 = t, we'll use the HMM smoothing calculations.

1. Forward Pass: Using the forward algorithm, we calculate the forward probabilities (α) for each hidden state at each time step.

α(0, R) = P(S\_0 = R) \* P(O\_0 = t | S\_0 = R) = 0.5 \* 0.9 = 0.45 α(0, ~R) = P(S\_0 = ~R) \* P(O\_0 = t | S\_0 = ~R) = 0.5 \* 0.2 = 0.1

1. Backward Pass: Using the backward algorithm, we calculate the backward probabilities (β) for each hidden state at each time step.

β(1, R) = P(O\_2 = t | S\_1 = R) \* P(S\_1 = R | S\_0 = R) \* β(2, R) + P(O\_2 = t | S\_1 = ~R) \* P(S\_1 = ~R | S\_0 = R) \* β(2, ~R) β(1, ~R) = P(O\_2 = t | S\_1 = R) \* P(S\_1 = R | S\_0 = ~R) \* β(2, R) + P(O\_2 = t | S\_1 = ~R) \* P(S\_1 = ~R | S\_0 = ~R) \* β(2, ~R)

Since we don't have information about the observations on day 2, we assume β(2, R) = 1 and β(2, ~R) = 1.

β(1, R) = P(O\_2 = t | S\_1 = R) \* P(S\_1 = R | S\_0 = R) \* 1 + P(O\_2 = t | S\_1 = ~R) \* P(S\_1 = ~R | S\_0 = R) \* 1 β(1, ~R) = P(O\_2 = t | S\_1 = R) \* P(S\_1 = R | S\_0 = ~R) \* 1 + P(O\_2

Exam 27.5.2020 AI Name:

1. Here is a Minimax tree: MAX

MIN

-4 10 12 10 -3 2

a) Find the best plies. 3 grades

b) Solve the problem by alfa – beta prunning, will it be effective? If yes, show how. 3 grades

d) If there are 4 players and they alternate their moves, draw the Minimax tree. The game ends after one move of each player. The game is zero sum game. 4 grades

together **10 grades**

1. a) Prove, that X is true . What is your method? KB:  3 grades

b) Prove the same as in a) but with a help of resolution. 5 grades

c) What is Horn clausa? 2 grades together **10 grades**

1. Here is a prisoners dilemma with this payoff matrix

A: testify

A: refuse

B: testify

B: refuse

PA=-5, PB=-5

PA=-10, PB=0

PA=0, PB=-10

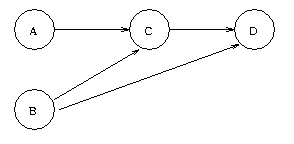
PA=-1, PB=-1

Next move is going to be with the probability *p*, and the players play (refuse, refuse ) first 20 moves. Then in 21-st move player B testifies and they play TFT up to infinity.

1. Calculate gains of A and B? 4 grades
2. Is there such value of *p*, that B after 10 moves, that means in 31. move is tempted to go back to refuse again, providing they then play TFT up to infinity? 6 grades
3. What is Nash equilibrium? Define. 3 grades
4. What is strategic profile of game with n players? 2 grades

**Together 15 grades.**

1. We have this Bayesian network, all variables are boolean



1. Specify all necessary tables, put nontrivial values in them (no zeros and ones) . 3 grades
2. Calculate P(a/c), **P**(D/a,c), P(a/c). Find a correct formula and put correct values inside. Not necessary to calculate numbers. 6grades
3. Calculate atomic event probabilities. Just put a correct numbers into formulas, not necessary to calculate numerical result: P(a,b, c,d), P(a, b, c, d) 4 grades.
4. What is the difference between the chain rule and Bayes net rule? 2 grades

together **15 grades**

1. a) What is POP plan? 2 grades

b) What is totally ordered plan and how it can be derived from the POP? Is there

only one totally ordered plan for one POP? 3 grades**, together 5 grades**