Artificial Intelligence Lab 3 : Environments

1 Funny Text generation

1. Find out the list of unique words in the 'speeches.txt' file, and find their word count. [15 Marks]
2. Let the unique words be n. Form the n $\times$ n matrix, where the i^{th} row corresponds to the i^{th} word, and the $(i,j)^{th}$ entry stands for the frequency of occurrence of j^{th} word after the i^{th} word. Write a function, which accepts a given word, and returns the frequency of occurrence of the next word. [15 Marks]
3. Use the $n \times n$ matrix to sample the next word given the current word and generate a "funny" text file of 1000 words. [20 Marks]

2 Generate Scorecard in Cricket

- At any point of time only 2 batsmen are playing. Let us consider them to be a single entity. Thus there are 10 batsmen in our model, i.e., $(1,2),(2,3),\ldots,(10,11)$.
- There are 5 possible shots, i.e., trying to score $A = \{1,2,3,4,6\}$. These shots are associated with the risk of getting out, and it varies from batsmen to batsmen. The top batsman (remember this is the players $(1,2)$ put together) has the following probabilities of getting out $p^{out}_{\min} = \{0.01, 0.02, 0.03, 0.1, 0.3\}$, where the i^{th} entry is for the i^{th} action. The last batsman (i.e., $(10,11)$ pair) has the following probabilities of getting out $p^{out}_{\max} = \{0.1, 0.2, 0.3, 0.5, 0.7\}$. If there are w wickets in hand, then use the formula $p^{out}(a,w) = p^{out}_{\max}(a) + (p^{out}_{\min}(a) - p^{out}_{\max}(a)) \times ((w-1)/9)$
- When the batsman is not getting out, the probability of successfully obtaining the runs for that shot is given by $p^{run}(w) = p^{run}_{\min} + (p^{run}_{\max} - p^{run}_{\min}) \times ((w-1)/9)$. Take $p^{run}_{\min} = 0.5$, and $p^{run}_{\max} = 0.8$.

1. Implement an *environment* that:
   i) maintains $s_t = (b_t, w_t)$, where b_t is the balls left and w_t is the wickets left at time t. Initialise the start state to $s_1 = (300, 10)$.
   ii) accepts input as $a_t \in A$ and returns r_t (the runs scored on that shot) and s_t, and updates s_{t+1}.
   [15 Marks]
2. Keep playing $a_t = 1, \forall t$ and find the average balls played by
   $i)$ 1^{st} batman [10 Marks]
   $ii)$ Last batsman [5 Marks]
3. Keep playing $a_t = 6, \forall t$ and find the average runs scored by the
   $i)$ 1^{st} batsman. [5 Marks]
   $ii)$ last batsman. [5 Marks]
4. Simulate 10 matches, for different constant strategies, i.e., $a_t = 1, \forall t$, $a_t = 2, \forall t$, $a_t = 3, \forall t$, $a_t = 4, \forall t$, $a_t = 6, \forall t$. [10 Marks]