18CSC305J- ARTIFICIAL INTELLEGENCE Experiment-1

Implementation of Toy Problem using Python

Team AI 4 life :

Sai Mohith Ambekar – 137

Aayushi Goenka – 151

Sonia Raja– 152

Praneet Botke – 149

Sadekar Adesh - 141

Aim:

(Camel Banana problem) A person has 3000 bananas and a camel. The person wants to transport the maximum number of bananas to a destination which is 1000 KMs away, using only the camel as a mode of transportation. The camel cannot carry more than 1000 bananas at a time and eats a banana every km it travels. What is the maximum number of bananas that can be transferred to the destination using only camel (no other mode of transportation is allowed) .

Solution & Procedure:

Let's see what we can infer from the question:

- We have a total of 3000 bananas. • The destination is 1000KMs
- Only 1 mode of transport.
- Camel can carry a maximum of 1000 banana at a time.
- Camel eats a banana every km it travels.

With all these points, we can say that person won't be able to transfer any banana to the destination as the camel is going to eat all the banana on its way to the destination.

But the trick here is to have intermediate drop points, then, the camel can make several short trips in between.

Also, we try to maintain the number of bananas at each point to be multiple of 1000.

Let's have 2 drop points in between the source and destination.

With 3000 bananas at the source. 2000 at a first intermediate point and 1000 at 2nd intermediate point.

- To go from source to IP1 point camel has to take a total of 5 trips 3 forward and 2 backward. Since we have 3000 bananas to transport.
- The same way from IP1 to IP2 camel has to take a total of 3 trips, 2 forward and 1 backward. Since we have 2000 bananas to transport.
- At last from IP2 to a destination only 1 forward move.

Let's see the total number of bananas consumed at every point.

- From the source to IP1 its 5x bananas, as the distance between the source and IP1 is x km and the camel had 5 trips.
- From IP1 to IP2 its 3y bananas, as the distance between IP1 and IP2 is y km and the camel had 3 trips.
- From IP2 to destination its z bananas.

Sanjukta Sen
RA1911028010039

Camel Banana Problem Solution

Source ——— IP1 ——— IP2 ——— Destination.
3000   x km   2000   y km   1000   z km

Calculating the distance between the points:

1. $3000 - 5x = 2000$ $\therefore x = 200$

2. $2000 - 3y = 1000$ $y = 333.33$ but here the distance is also the number of bananas and it cannot be fraction so we take $y = 333$ and at IP2 we have the number of bananas equal 1001, so its $2000 - 3y = 1001$

3. So, the remaining distance to the market is $1000 - x - y = z$ i.e $1000 - 200 - 333 \Rightarrow z = 467$

Now there are 1001 bananas at IP2.

$\therefore$ Remaining bananas are $1001 - 467 = 534$

Code:

```python
tot = int(input("Enter Number of Bananas at Starting: "))

dist = int(input("Enter Distance you want to Cover(Km): "))

camelCapacity = int(input("Enter Maximum Load Capacity of the Camel: "))

ate = 0 #(bananas being eaten by the camel)

start = tot

for i in range(dist):

    while start>0:

        start = start-camelCapacity

        if start == 1:

            ate = ate - 1

        ate = ate + 2

    ate = ate - 1

    start = tot- ate

    if start == 0:

        break

final = start

print(f"The Maximum Number of Bananas that can be transported by the camel at the Market Place = {final}.")
```

```
In [1]: tot = int(input("Enter Number of Bananas at Starting: "))

        dist = int(input("Enter Distance you want to Cover(Km): "))

        camelCapacity = int(input("Enter Maximum Load Capacity of the Camel: "))

        ate = 0 #(bananas being eaten by the camel)

        start = tot

        for i in range(dist):
            while start>0:
                start = start-camelCapacity
                if start == 1:
                    ate = ate - 1

                ate = ate + 2

            ate = ate - 1
            start = tot- ate
            if start == 0:
                break

        final = start

        print(f"The Maximum Number of Bananas that can be transported by the camel at the Market Place = {final}.")

        Enter Number of Bananas at Starting: 3000
        Enter Distance you want to Cover(Km): 1000
        Enter Maximum Load Capacity of the Camel: 1000
        The Maximum Number of Bananas that can be transported by the camel at the Market Place = 533.
```

Output:

```
Enter no. of bananas at starting3000
Enter distance you want to cover1000
Enter max load capacity of your camel1000
533
```

Result:

Theoretically, the maximum number of bananas that can be transported using one camel, keeping all boundary conditions in mind is 534.

Experimentally, the maximum number of bananas that can be transported using one camel is 533.

Theoretical value ≈ Experimental value

Therefore, we can say that the camel banana problem has been successfully implemented and the final number of bananas that can be transported is verified.