

Artificial Intelligence Lab

EXP: 1 Implementation of Toy Problem

Camel Banana Problem

Team Ai for life

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Aim: -

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.

Code:

```
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: #if only 1 banana is left the camel doesn't move back.
            ate = ate - 1 #it is decreased as if camel tries to get remaining banana he will eat another one for covering that two
            miles.

        ate = ate + 2

        ate = ate - 1 #as the camel will not go back so "ate" is decreased.
        start = tot - ate

    if start == 0: #for checking is it possible to take the single banana or not.
```

```
break

final = start

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

Output:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  Python +
/usr/local/bin/python3 "/Users/saimohitambekar/Documents/Sai Work/Class/AI Lab/lab1.py"
saimohitambekar@Sais-MacBook-Air AI Lab % /usr/local/bin/python3 "/Users/saimohitambekar/Documents/Sai Work/Class/AI Lab/lab1.py"
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 till the Market Place = 533.
saimohitambekar@Sais-MacBook-Air AI Lab %
```

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 \approx 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.