

Best Advertisement Using MAB

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Code:

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import pandas as pd

try:
    df = pd.read_csv('Ads_CTR_Optimisation.csv')
    print("Dataset loaded successfully.")
    print(df.head())
except FileNotFoundError:
    print("Error: Ads_CTR_Optimisation.CSV not found. Please make sure the file is in the correct directory.")
    df = None

import random
num_ads = df.shape[1]
num_users = df.shape[0]

ads_selected = [0] * num_ads
rewards_sum = [0] * num_ads

print(f"Number of ads: {num_ads}")
print(f"Number of users: {num_users}")
print(f"Epsilon value: {epsilon}")

import random
selected_ads = []
total_reward = 0

for user in range(num_users):
    ad_to_select = -1
    if random.random() < epsilon:
        ad_to_select = random.randrange(num_ads)
    else:
        max_reward = -1
        for ad in range(num_ads):
            if ads_selected[ad] > 0:
                average_reward = rewards_sum[ad] / ads_selected[ad]
            else:
                average_reward = 0

        if average_reward > max_reward:
            max_reward = average_reward
            ad_to_select = ad
    if ad_to_select == -1:
        ad_to_select = random.randrange(num_ads)
```

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ads_selected[ad_to_select] += 1
reward = df.values[user, ad_to_select]
rewards_sum[ad_to_select] += reward
total_reward += reward

selected_ads.append(ad_to_select)

print("Epsilon-greedy simulation completed.")
print(f"Total reward obtained: {total_reward}")
most_selected_ad = selected_ads.count(max(selected_ads,
key=selected_ads.count))
best_ad_index = rewards_sum.index(max(rewards_sum))

print(f"Ad selection counts: {ads_selected}")
print(f"Sum of rewards for each ad: {rewards_sum}")
print(f"The ad selected most often was Ad
{selected_ads.count(max(selected_ads, key=selected_ads.count))} with
{max(selected_ads, key=selected_ads.count)} selections.")
print(f"The ad with the highest total reward is Ad {best_ad_index} with a
total reward of {rewards_sum[best_ad_index]}.")

average_rewards = [rewards_sum[i] / ads_selected[i] if ads_selected[i] > 0
else 0 for i in range(num_ads)]
print(f"Average reward for each ad: {average_rewards}")

best_ad_average_reward = average_rewards.index(max(average_rewards))
print(f"The ad with the highest average reward is Ad
{best_ad_average_reward} with an average reward of
{average_rewards[best_ad_average_reward]:.4f}.")
import matplotlib.pyplot as plt

plt.figure(figsize=(10, 6))
plt.bar(range(num_ads), ads_selected)
plt.title('Number of Times Each Ad Was Selected (Epsilon-Greedy)')
plt.xlabel('Ad Number')
plt.ylabel('Number of Selections')
plt.xticks(range(num_ads))
plt.show()

plt.figure(figsize=(10, 6))
plt.bar(range(num_ads), average_rewards)
plt.title('Average Reward for Each Ad (Epsilon-Greedy)')
plt.xlabel('Ad Number')
plt.ylabel('Average Reward')
plt.xticks(range(num_ads))
plt.show()

```

Output:

