

[SOLUTION] CS-465-204-AI-Lab-Finalterm-Version[B]

April 19, 2023

1 Finalterm Exam

1.0.1 Question # 01

Write a Python function that takes in two Numpy arrays and returns their dot product. For example, given the following input arrays:

```
arr1 = np.array([1, 2, 3]) arr2 = np.array([4, 5, 6])
```

The function should return 32, since the dot product of arr1 and arr2 is $1 * 4 + 2 * 5 + 3 * 6 = 32$.

```
[1]: import numpy as np
def dot_product(arr1, arr2):
    return np.sum(arr1 * arr2)

arr1 = np.array([1, 2, 3])
arr2 = np.array([4, 5, 6])
result = dot_product(arr1, arr2)
print(result)
```

32

1.0.2 Question # 02

The situation is, Netflix provide some information about their shows. All this information is enclosed in “netflix.csv” file. Using pandas library, answer the following.

- i. All Movies from Pakistan
- ii. All shows released after 2015
- iii. All Movies from India
- iv. All shows where title is "Yeh Meri Family"

```
[2]: import pandas as pd
data = pd.read_csv('netflix.csv')
df = pd.DataFrame(data)
```

```
[3]: df[(df['type'] == 'Movie') & (df['country'] == 'Pakistan')]
```

```
[3]:
```

	show_id	type		title \
12	s852	Movie		99 Songs (Tamil)
66	s1093	Movie		Dolly Parton: A MusiCares Tribute
110	s405	Movie		9to5: The Story of a Movement
126	s642	Movie		Sisters on Track
151	s718	Movie		Headspace: Unwind Your Mind
...
7932	s4535	Movie		Super Monsters Save Halloween
8289	s5787	Movie	Karol Modzelewski, Łukasz „Lotek” Lodkowski No...	
8325	s5920	Movie		Iliza Shlesinger: Freezing Hot
8524	s7117	Movie		Jake's Buccaneer Blast
8525	s7139	Movie		John Mellencamp: Plain Spoken

	director	country	date_added	release_year	rating	duration \
12	Not Given	Pakistan	5/21/2021	2021	TV-14	131 min
66	Not Given	Pakistan	4/7/2021	2021	TV-PG	55 min
110	Not Given	Pakistan	7/22/2021	2021	TV-MA	85 min
126	Not Given	Pakistan	6/24/2021	2021	PG	97 min
151	Not Given	Pakistan	6/15/2021	2021	TV-G	273 min
...
7932	Not Given	Pakistan	10/5/2018	2018	TV-Y	25 min
8289	Not Given	Pakistan	9/19/2016	2016	TV-MA	65 min
8325	Not Given	Pakistan	1/23/2015	2015	TV-MA	72 min
8524	Not Given	Pakistan	8/6/2017	2014	TV-Y	22 min
8525	Not Given	Pakistan	2/1/2018	2017	TV-MA	80 min

	listed_in
12	Dramas, International Movies, Music & Musicals
66	Documentaries, Music & Musicals
110	Documentaries
126	Documentaries, Sports Movies
151	Documentaries
...	...
7932	Children & Family Movies
8289	Stand-Up Comedy
8325	Stand-Up Comedy
8524	Movies
8525	Documentaries, Music & Musicals

[71 rows x 10 columns]

```
[4]: df[(df['type'] == 'TV Show') & (df['release_year'] > 2015)]
```

```
[4]:
```

	show_id	type		title	director \
1	s3	TV Show		Ganglands	Julien Leclercq
2	s6	TV Show		Midnight Mass	Mike Flanagan
5	s9	TV Show	The Great British Baking Show		Andy Devonshire

17	s4	TV Show	Jailbirds New Orleans	Not Given
18	s15	TV Show	Crime Stories: India Detectives	Not Given
...
8781	s8776	TV Show	Yeh Meri Family	Not Given
8785	s8797	TV Show	Yunus Emre	Not Given
8786	s8798	TV Show	Zak Storm	Not Given
8788	s8784	TV Show	Yoko	Not Given
8789	s8786	TV Show	YOM	Not Given

		country	date_added	release_year	rating	duration	\
1		France	9/24/2021	2021	TV-MA	1 Season	
2		United States	9/24/2021	2021	TV-MA	1 Season	
5		United Kingdom	9/24/2021	2021	TV-14	9 Seasons	
17		Pakistan	9/24/2021	2021	TV-MA	1 Season	
18		Pakistan	9/22/2021	2021	TV-MA	1 Season	
...		
8781		India	8/31/2018	2018	TV-PG	1 Season	
8785		Turkey	1/17/2017	2016	TV-PG	2 Seasons	
8786		United States	9/13/2018	2016	TV-Y7	3 Seasons	
8788		Pakistan	6/23/2018	2016	TV-Y	1 Season	
8789		Pakistan	6/7/2018	2016	TV-Y7	1 Season	

		listed_in
1		Crime TV Shows, International TV Shows, TV Act...
2		TV Dramas, TV Horror, TV Mysteries
5		British TV Shows, Reality TV
17		Docuseries, Reality TV
18		British TV Shows, Crime TV Shows, Docuseries
...		...
8781		International TV Shows, TV Comedies
8785		International TV Shows, TV Dramas
8786		Kids' TV
8788		Kids' TV
8789		Kids' TV

[2035 rows x 10 columns]

```
[5]: df[(df['type'] == 'Movie') & (df['country'] == 'India')]
```

	show_id	type	title	director	\
7	s939	Movie	Motu Patlu in the Game of Zones	Suhas Kadav	
9	s940	Movie	Motu Patlu in Wonderland	Suhas Kadav	
10	s941	Movie	Motu Patlu: Deep Sea Adventure	Suhas Kadav	
11	s942	Movie	Motu Patlu: Mission Moon	Suhas Kadav	
29	s25	Movie	Jeans	S. Shankar	
...	
8442	s6708	Movie	Ethirmarai	Not Given	

8475	s6908	Movie		Haapus	Not Given
8520	s7169	Movie		Kanika	Not Given
8595	s7663	Movie	One Heart: The A.R. Rahman Concert Film		Not Given
8763	s8648	Movie	Twisted Trunk, Big Fat Body		Not Given

	country	date_added	release_year	rating	duration	\
7	India	5/1/2021	2019	TV-Y7	87 min	
9	India	5/1/2021	2013	TV-Y7	76 min	
10	India	5/1/2021	2014	TV-Y7	76 min	
11	India	5/1/2021	2013	TV-Y7	71 min	
29	India	9/21/2021	1998	TV-14	166 min	
...	
8442	India	4/1/2018	2018	TV-14	91 min	
8475	India	3/15/2018	2010	TV-14	138 min	
8520	India	3/1/2018	2017	TV-14	110 min	
8595	India	11/1/2017	2017	TV-G	87 min	
8763	India	1/15/2017	2015	TV-14	89 min	

	listed_in
7	Children & Family Movies, Comedies, Music & Mu...
9	Children & Family Movies, Music & Musicals
10	Children & Family Movies, Comedies
11	Children & Family Movies, Comedies
29	Comedies, International Movies, Romantic Movies
...	...
8442	International Movies, Music & Musicals, Thrillers
8475	Comedies, Dramas, International Movies
8520	Horror Movies, International Movies, Thrillers
8595	Documentaries, International Movies, Music & M...
8763	Dramas, International Movies

[976 rows x 10 columns]

```
[6]: df[(df['type'] == 'TV Show') & (df['title'] == 'Yeh Meri Family')]
```

```
[6]:   show_id    type      title  director country date_added \
8781   s8776  TV Show  Yeh Meri Family  Not Given    India  8/31/2018

      release_year rating  duration                                listed_in
8781          2018   TV-PG    1 Season  International TV Shows, TV Comedies
```

1.0.3 Question # 03

Your doctor advised you to follow the healthy diet for few months to gain weight. He gave you weekly chart to follow the diet plan.

MON Boiled Egg, Sea Food

TUE Boiled Egg, Whole Wheat Toast

WED Boiled Egg, Whole Wheat Toast, Almond Milk
THU Boiled Egg, Oats
FRI Boiled Egg, Sea food
SAT Banana, Almond Milk
SUN Chicken, Oats, Banana

He also restricted you to take care of few things to maintain your health.

You can't take same food on Monday & Tuesday
You can't take Boiled Egg on Tuesday, Wednesday & Thursday
You can take Oats only on Thursday
You can't take same food on Friday & Monday
You must take Chicken on every Sunday
You can take Almond Milk either on Wednesday or Saturday
You must take one Banana in every weekend

Using backtrack, solve this problem as a CSP problem in which there is one food item per day, stating the domains, and constraints. Constraints should be specified formally and precisely.

```
[7]: from simpleai.search import CspProblem, backtrack

def func(names, values):
    return values[0] != values[1]

var = ('MON', 'TUE', 'WED', 'THU', 'FRI', 'SAT', 'SUN')

domain = {
    'MON': ['Boiled Egg', 'Sea Food'],
    'TUE': ['Whole Wheat Toast'],
    'WED': ['Almond Milk'],
    'THU': ['Oats'],
    'FRI': ['Boiled Egg', 'Sea Food'],
    'SAT': ['Almond Milk', 'Banana'],
    'SUN': ['Chicken', 'Banana']
}

constraints = [
    (('MON', 'TUE'), func),
    (('TUE', 'WED'), func),
    (('WED', 'SAT'), func),
    (('MON', 'FRI'), func),
    (('TUE', 'THU'), func),
    (('WED', 'THU'), func),
    (('SUN', 'SAT'), func),
]

problem = CspProblem(var, domain, constraints)
output = backtrack(problem)
```

```
for k, v in output.items():  
    print(k, '==>', v)
```

```
MON ==> Boiled Egg  
TUE ==> Whole Wheat Toast  
WED ==> Almond Milk  
THU ==> Oats  
FRI ==> Sea Food  
SAT ==> Banana  
SUN ==> Chicken
```