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• در تمام اسکرین شات ها ar نشان دهنده arg ورودی است

ب) در این بخش، ابتدا در small grid اجرا میکنیم:

```
graphicsDispla
keyboardAnen
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GameState
SCARED_TIME
COLLISION_TOLERANCE
TIME_PENALTY
ClassicGameRules
PacmanRules
GhostRules
default(str)

"""
ar = "-p PacmanQAgent -x 2000 -n 2010 -l smallGrid".split()
args = readCommand(ar_) # Get game components based on input
runGames(**args_)

# import cProfile
# cProfile.run("runGames( **args )")
pass

if __name__ == '__main__':
```

```
pacman x
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 495
Pacman emerges victorious! Score: 503
('Average Score:', 500.6)
('Scores:      ', '495, 503, 503, 499, 503, 499, 503, 503, 495, 503')
Win Rate:      10/10 (1.00)
('Record:      ', 'Win, Win, Win, Win, Win, Win, Win, Win, Win, Win')

Process finished with exit code 0
```

اجرا با پارامتر های متفاوت:

```
venv
environment.p
featureExtrac
663
664
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game.py
ghostAgents.p
graphicsDispla
GameState
SCARED_TIME
COLLISION_TOLERANCE
TIME_PENALTY
ClassicGameRules
PacmanRules
GhostRules
default(str)

ar = "-p PacmanQAgent -x 2000 -n 2010 -l smallGrid -a alpha=0.7,gamma=0.3,epsilon=0.1".split()
args = readCommand(ar_) # Get game components based on input
runGames(**args_)

# import cProfile
# cProfile.run("runGames( **args )")
pass

if __name__ == '__main__':
```

```
pacman x
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 504
Pacman emerges victorious! Score: 495
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 504
Pacman emerges victorious! Score: 504
Pacman emerges victorious! Score: 503
('Average Score:', 502.6)
('Scores:      ', '503, 503, 504, 503, 504, 495, 503, 504, 504, 503')
Win Rate:      10/10 (1.00)
('Record:      ', 'Win, Win, Win, Win, Win, Win, Win, Win, Win, Win')
```

اجرا medium Grid :

[illegible]

اجرا در classic :

```
661 > python pacman.py --help
662 """
663 ar = "-p PacmanQAgent -x 2000 -n 2010 -l mediumClassic".split()
664 args = readCommand(ar____)# Get game components based on input
665 runGames(**args)
666
667 # import cProfile
668 # cProfile.run("runGames( **args )")
669 pass

if __name__ == '__main__':
```

Pacman died! Score: -465
Pacman died! Score: -399
Pacman died! Score: -394
Pacman died! Score: -518
(Average Score:', -442.8)
(Scores: ', '-469, -397, -487, -436, -451, -412, -465, -399, -394, -518')
Win Rate: 0/10 (0.00)
(Record: ', 'Loss, Loss, Loss, Loss, Loss, Loss, Loss, Loss, Loss, Loss')

Process finished with exit code 0

همانطور که مشخص است با بزرگتر شدن اندازه، عملکرد اصلا خوب نخواهد بود، دلیل این اتفاق، بزرگتر بودن تعداد حالت ها است که چون خیلی از آنها دیده نمی شوند، تصمیم درستی برای آنها گرفته نمی شود. در نتیجه شاید بتوان با ترینینگ بیشتر عملکرد را بهبود داد.

(ج) مطابق توضیحات عمل میکنیم:

ابتدا برای اسمال:

```
"""
ar = "-p ApproximateQAgent -x 2000 -n 2010 -a extractor=IdentityExtractor -l smallGrid".split()
args = readCommand(ar) # Get game components based on input
runGames(**args)

# import cProfile
# cProfile.run("runGames( **args )")
pass

if __name__ == '__main__':
    pass

Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 499
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 503
Pacman emerges victorious! Score: 495
('Average Score:', 500.6)
('Scores: ', '499, 499, 499, 503, 503, 499, 503, 503, 495')
Win Rate: 10/10 (1.00)
('Record: ', 'Win, Win, Win, Win, Win, Win, Win, Win, Win')
Process finished with exit code 0
```

نتیجه مشابه حالت قبل است تقریبا

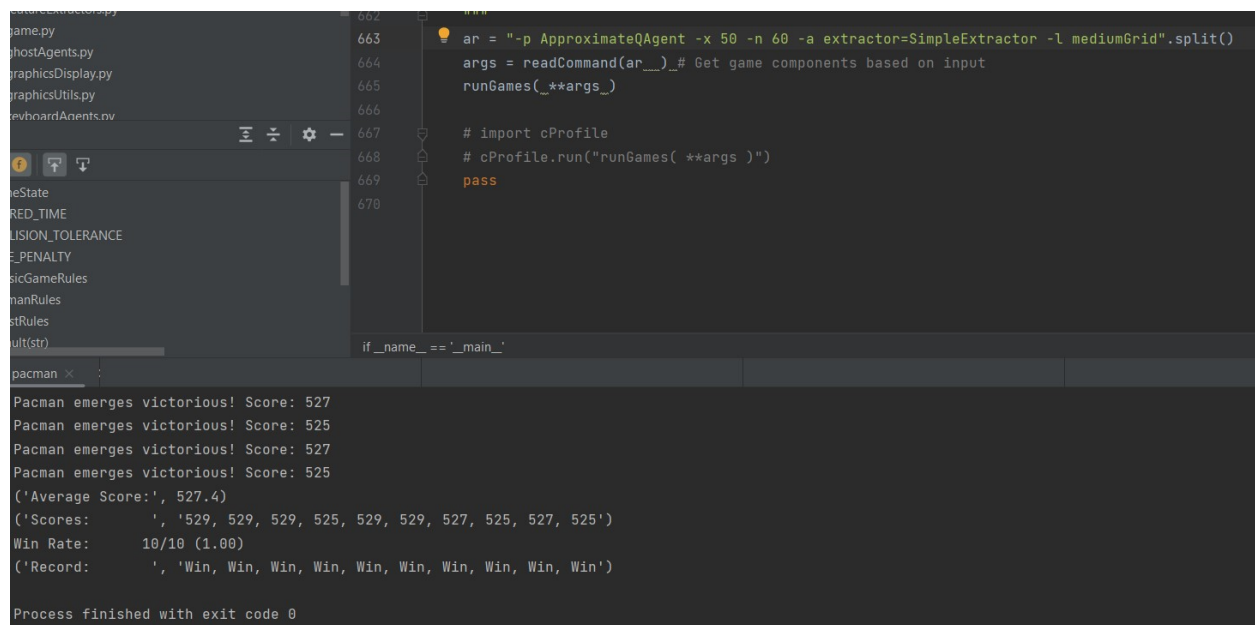
```
> python pacman.py --help
"""
ar = "-p ApproximateQAgent -x 50 -n 60 -a extractor=SimpleExtractor -l smallGrid".split()
args = readCommand(ar) # Get game components based on input
runGames(**args)

# import cProfile
# cProfile.run("runGames( **args )")
pass

if __name__ == '__main__':
    pass

Pacman emerges victorious! Score: 499
Pacman emerges victorious! Score: 507
Pacman died! Score: -504
Pacman emerges victorious! Score: 507
('Average Score:', 302.4)
('Scores: ', '499, 507, 507, 499, 507, -504, 499, 507, -504, 507')
Win Rate: 8/10 (0.80)
('Record: ', 'Win, Win, Win, Win, Win, Loss, Win, Win, Loss, Win')
Process finished with exit code 0
```

برای مدیوم داریم:



```
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670
if __name__ == '__main__':
    ar = "-p ApproximateQAgent -x 50 -n 60 -a extractor=SimpleExtractor -l mediumGrid".split()
    args = readCommand(ar) # Get game components based on input
    runGames(**args)

# import cProfile
# cProfile.run("runGames( **args )")
pass
```

Pacman emerges victorious! Score: 527
Pacman emerges victorious! Score: 525
Pacman emerges victorious! Score: 527
Pacman emerges victorious! Score: 525
(Average Score:', 527.4)
(Scores: ', '529, 529, 529, 525, 529, 529, 527, 525, 527, 525')
Win Rate: 10/10 (1.00)
(Record: ', 'Win, Win, Win, Win, Win, Win, Win, Win, Win, Win')

Process finished with exit code 0

دلیل عملکرد بهتر نسبت به اسمال، این است که در جایی گیر نمی کند. نسبت به بخش
ب اما خیلی بهتر عمل می کند.
مدیوم کلاسیک:

```
featureExtractors.py
game.py
ghostAgents.py
graphicsDisplay.py
graphicsUtils.py
keyboardAgents.py
...
662 """
663 ar = "-p ApproximateQAgent -x 50 -n 60 -a extractor=SimpleExtractor -l mediumClassic".split()
664 args = readCommand(ar_...) # Get game components based on input
665 runGames(**args_)
666
667 # Import cProfile
668 # cProfile.run("runGames( **args )")
669 pass
670
...
if __name__ == '__main__':
    ...

```

Pacman emerges victorious! Score: 1336
Pacman emerges victorious! Score: 1331
Pacman emerges victorious! Score: 1347
Pacman emerges victorious! Score: 1327
('Average Score:', 1213.6)
('Scores: ', '1331, 1324, 170, 1310, 1332, 1328, 1336, 1331, 1347, 1327')
Win Rate: 9/10 (0.90)
('Record: ', 'Win, Win, Loss, Win, Win, Win, Win, Win, Win, Win')
Process finished with exit code 0

با اینکه این حالت بسیار پیچیده تر از بقیه است، و X هم کم در نظر گرفته شده، نتیجه بسیار خوب است.

```
{'closest-food': -2.642935051903254, 'bias': 223.97780971996315, '#-of-ghosts-1-step-away': -87.3239529546817, 'eats-food': 274.1672737466258}  
Pacman emerges victorious! Score: 1331
```

همانطور که مشخص است، هیچ اشاره ای به سفید شدن روح ها نشده است، که این امر باعث می شود در چنین زمان هایی همچنان از روح ها دور شویم. برای بهتر شدن می توان این عامل هم در نظر گرفت.