**Linear Algebra Programming Project**

2022-12-17

■ There are two iterative methods to estimate an eigenvalue. One is the power method for estimating a strictly dominant eigenvalue. The other is the inverse power method for estimating an eigenvalue with roughly estimated eigenvalues. The iterative process of these two methods are described as below.

텍스트이(가) 표시된 사진

자동 생성된 설명

텍스트이(가) 표시된 사진

자동 생성된 설명

1. (15pt) Estimate a strictly dominant eigenvalue of a matrix with initial vector described as following.

Q1.1. What kind of method do you choose? Explain the reason of your selection.

**The power method, 이 방식이 a strictly dominant eigenvalue 추정에 더 효율적이기 때문이다.**

Q1.2. Write a code to estimate a strictly dominant eigenvalue of A with initial vector .

**제출 파일 hw1.py 참고**

Q1.3. Fill in the blanks in the table below. **소수점 6자리까지 표현(7짜리에서 반올림함)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Iteration | 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | 8 | 7.125 | 7.017544 | 7.0025 | 7.000357 |

2. (15pt) Estimating an eigenvalue , which are the two smallest eigenvalues of with initial vector described as following.

with roughly estimated eigenvalues 21, 3.3, and 1.9

Q2.1. What kind of method do you choose? Explain the reason of your selection.

**The inverse power method, 이 방식이 임의의 eigenvalue 추정에 더 효율적이기 때문이다.**

Q2.2. Write a code to estimate the two smallest eigenvalues of with initial vector .

**제출 파일 hw2.py참고**

Q2.3. Draw two tables to estimate the two smallest eigenvalues of with initial vector .

**소수점 6자리까지 표현(7짜리에서 반올림함)** **α=1.9**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Iteration | 0 | 1 | 2 | 3 | 4 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | 7.758805 | 9.9197 | 9.994931 | 9.999646 | 9.999975 |
|  | 2.028886 | 2.00081 | 2.000051 | 2.000004 | 2 |

**소수점 6자리까지 표현(7짜리에서 반올림함) α=3.3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Iteration | 0 | 1 | 2 | 3 | 4 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | 41.045365 | 47.486662 | 47.119503 | 47.125168 | 47.125075 |
|  | 3.324363 | 3.321059 | 3.321223 | 3.32122 | 3.32122 |