**DAILY ASSESSMENT FORMAT**

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| **Date:** | **17th July 2020** | **Name:** | **Sushmitha R Naik** |
| **Course:** | **coursera** | **USN:** | **4AL17EC090** |
| **Topic:** | * **Mathematics for machine learning: Linear Algebra** * **CERTIFICATE** | **Semester & Section:** | **6th sem ‘B’ sec** |
| **GitHub Repository:** | **Sushmitha\_naik** |  |  |

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| **FORENOON SESSION DETAILS** |
| **Image of session**        **Report:**  **An eigenvector, corresponding to a**[**real**](https://en.wikipedia.org/wiki/Real_number)**nonzero eigenvalue, points in a direction in which it is**[**stretched**](https://en.wikipedia.org/wiki/Scaling_(geometry))**by the transformation and the eigenvalue is the factor by which it is stretched. If the eigenvalue is negative, the direction is reversed. Loosely speaking, in a multidimensional**[**vector space**](https://en.wikipedia.org/wiki/Vector_space)**, the eigenvector is not rotated. However, in a one-dimensional vector space, the concept of**[**rotation**](https://en.wikipedia.org/wiki/Rotation)**is meaningless.**  **If *T* is a linear transformation from a vector space *V* over a**[**field**](https://en.wikipedia.org/wiki/Field_(mathematics))***F* into itself and v is a**[**nonzero**](https://en.wikipedia.org/wiki/Zero_vector)**vector in *V*, then v is an eigenvector of *T* if *T*(v) is a scalar multiple of v. This can be written as {\displaystyle T(\mathbf {v} )=\lambda \mathbf {v} ,}where *λ* is a scalar in *F*, known as the eigenvalue, characteristic value, or characteristic root associated with v.**  **There is a direct correspondence between *n*-by-*n***[**square matrices**](https://en.wikipedia.org/wiki/Square_matrix)**and linear transformations from an**[***n*-dimensional**](https://en.wikipedia.org/wiki/Dimension)**vector space into itself, given any**[**basis**](https://en.wikipedia.org/wiki/Basis_(linear_algebra))**of the vector space. Hence, in a finite-dimensional vector space, it is equivalent to define eigenvalues and eigenvectors using either the language of**[**matrices**](https://en.wikipedia.org/wiki/Matrix_(mathematics))**or the language of linear transformations.**  **If *V* is finite-dimensional, the above equation is equivalent to {\displaystyle A\mathbf {u} =\lambda \mathbf {u} .}where *A* is the matrix representation of *T* and u is the coordinate vector of v.**  **In essence, an eigenvector v of a linear transformation *T* is a nonzero vector that, when *T* is applied to it, does not change direction. Applying *T* to the eigenvector only scales the eigenvector by the scalar value *λ*, called an eigenvalue. This condition can be written as the equation {\displaystyle T(\mathbf {v} )=\lambda \mathbf {v} ,}referred to as the eigenvalue equation or eigenequation. In general, *λ* may be any**[**scalar**](https://en.wikipedia.org/wiki/Scalar_(mathematics))**. For example, *λ* may be negative, in which case the eigenvector reverses direction as part of the scaling, or it may be zero or**[**complex**](https://en.wikipedia.org/wiki/Complex_number)**.**  **Linear transformations can take many different forms, mapping vectors in a variety of vector spaces, so the eigenvectors can also take many forms. For example, the linear transformation could be a**[**differential operator**](https://en.wikipedia.org/wiki/Differential_operator)**like {\displaystyle {\tfrac {d}{dx}}}, in which case the eigenvectors are functions called**[**eigenfunctions**](https://en.wikipedia.org/wiki/Eigenfunction)**that are scaled by that differential operator, such as{\displaystyle {\frac {d}{dx}}e^{\lambda x}=\lambda e^{\lambda x}.}**  **Alternatively, the linear transformation could take the form of an *n* by *n* matrix, in which case the eigenvectors are *n* by 1 matrices. If the linear transformation is expressed in the form of an *n* by *n* matrix *A*, then the eigenvalue equation above for a linear transformation can be rewritten as the matrix multiplication{\displaystyle Av=\lambda v,}**  **where the eigenvector *v* is an *n* by 1 matrix. For a matrix, eigenvalues and eigenvectors can be used to**[**decompose the matrix**](https://en.wikipedia.org/wiki/Matrix_decomposition)**, for example by**[**diagonalizing**](https://en.wikipedia.org/wiki/Diagonalizable_matrix)**it.**  **Eigenvalues and eigenvectors give rise to many closely related mathematical concepts, and the prefix *eigen-* is applied liberally when naming them:**   * **The set of all eigenvectors of a linear transformation, each paired with its corresponding eigenvalue, is called the eigensystem of that transformation.**[**[5]**](https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors#cite_note-FOOTNOTEPressTeukolskyVetterlingFlannery2007536-5)[**[6]**](https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors#cite_note-FOOTNOTEWolfram.com:_Eigenvector-6) * **The set of all eigenvectors of *T* corresponding to the same eigenvalue, together with the zero vector, is called an eigenspace or characteristic space of *T* associated with that eigenvalue.** * **If a set of eigenvectors of *T* forms a**[**basis**](https://en.wikipedia.org/wiki/Basis_(linear_algebra))**of the domain of *T*, then this basis is called an eigenaxis.**   **Certificate:** |
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