DAILY ASSESSMENT FORMAT

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| **Date:** | **17/07/2020** | **Name:** | **Namratha S Hipparagi** |
| **Course:** | **Coursera** | **USN:** | **4AL16EC040** |
| **Topic:** | **Mathematics of machine learning-Linear algebra** | **Semester & Section:** | **8 A** |
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| **FORENOON SESSION DETAILS** |
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| **Report**  Eigenvalue and eigenvector are probably one of the most important concepts in linear algebra. Who can expect a simple equation like Av = λv is so significant? From machine learning to quantum computing, many problems can be solved by finding the eigenvalue and eigenvectors of a matrix. In this article, we will discover why it is so important and how we can apply it. We will also take a look into the Google PageRank, a core part of the Google search engine, to see how it is related to eigenvectors. Ax does not usually equal to λx. Only some exceptional vectors satisfy the condition. Here are some eigenvector examples.  Image for post  If the eigenvalue is greater than one, the corresponding Avᵢ will expand. If it is smaller than one, it will shrink.  Image for post **Application** But before getting into details, let’s pause and appreciate the beauty of such an abstract concept first. In specific, many problems can be modeled with linear algebra with solutions derived from eigenvalues and eigenvectors. Let’s start with an abstract example first before getting into a real billion-dollar idea — Google’s PageRank. In many systems, we can express its states in a vector with their rates of change linearly depend on the current states  Image for post  where u composes of n properties. So let’s take a guess on the solution for u(t) that satisfies the equation above. Since the derivative of an exponential function equals itself, we can start the guess with an exponential function of t and multiply it with a vector x.  *.* |

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| **Course:** | **Salesforce** | **USN:** | **4al16ec040** | |
| **Topic:** | **Salesforce platform basics** | **Semester & Section:** | **8 A** | |
| **AFTERNOON SESSION DETAILS** | | | |
| **Report** Learning Objectives After completing this unit, you’ll be able to:   * Explain why voice matters. * Name the core components that make Alexa work. * Describe the capabilities of Alexa and Alexa-enabled devices.  The Power of Voice To help set the stage for this module—let’s start by talking about the power of voice. At Amazon, **we believe voice represents the next major disruption in computing**.Voice interfaces are the next progression in a series of ever-adapting user interfaces that we use every day. In the early days of computing, there was the venerable punch card, which was a limited character interface. The next step up was to text-only graphical user interfaces (GUI). Following the introduction of the mouse, we then had a progression of GUI that used more and more advanced layouts with modern operating systems. In the 90s, the explosion of the Internet and web pages drove web design as the new frontier. Enter the smartphone in the early 2000s with a new touch-based interface. And now, with advancements in neural nets, natural language processing, and speech recognition, we have [voice user interfaces (VUI)](https://developer.amazon.com/alexa-skills-kit/vui).  VUI have also evolved over time. The days of “Press 1 for the front desk, press 2 for housekeeping, press 3 for reservations” are slowly shifting to a more conversational flow that is more natural for users and allows them to be more succinct and accurate in their request. This evolution is referred to as **conversational user interface.** User Makes a Request When you say the **wake word** (in this case we are using **Alexa** ), the light ring around the Echo begins to glow blue to indicate Alexa is now listening and streaming that data to the cloud. The captured audio is called an **utterance** . **Note** : You can also change the wake word to a couple of other words: Echo, Computer, and Amazon. Amazon Alexa Cloud Once the utterance has been received in the cloud, a series of speech models are applied to it using automatic speech recognition (ASR) and natural language understanding (NLU) to figure out what you wanted and where to route that. In the previous example, Alexa figured out that this was an **intent** to check the weather. Intents are registered by a **skill** that can handle the intents, and the skill provides a number of sample utterances to help Alexa map out where requests go. Using Voice Interfaces Let’s examine a common interaction with Alexa. If you don’t know who Alexa is:  Alexa is the brain behind the Amazon Echo family of devices and other Alexa-enabled devices. Using Alexa is as simple as asking a question—just ask, and Alexa responds instantly. Alexa lives in the cloud and is always getting smarter.  Getting back to that conversation, it can look something like this:  **A typical user** : “Alexa, do I need an umbrella today?”  **Alexa** : “It might rain in Seattle today. There’s a 55% chance. You can expect about 0.14 inches.”  A simple question, but many different things needed to happen to get that response. And yes, it does rain frequently in Seattle. Your Service/Skill Handling Skills are built utilizing the Alexa Skills Kit, a collection of self-service APIs, tools, documentation, and code samples that makes it fast and easy for anyone to build for voice. In this case, let’s assume there is an AWS Lambda function that calls a service to check on the weather forecast when an incoming intent from Alexa is received.  Skills can be built using many different options such as AWS Lambda, Heroku, and custom web services communicated over HTTPS. As long as the skill is built to handle the incoming Alexa request in a secure manner, it doesn’t matter where it is hosted or what language it is written in. | | | |