1 Calculate the eigenvalues & eigenvector of

$$A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

$= [A - I\lambda]\, x = 0$

$$\left[\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} - \lambda \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\right] x = 0$$

$$\left[\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} - \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix}\right] x = 0$$

$$\begin{bmatrix} 2-\lambda & 1-0 \\ 1-0 & 2-\lambda \end{bmatrix} x = 0$$

To find λ

$$\det \begin{bmatrix} 2-\lambda & 1 \\ 1 & 2-\lambda \end{bmatrix} = 0$$

$[(2-\lambda)(2-\lambda) - 1\times 1] = 0$

$= 4 - 2\lambda - 2\lambda + \lambda^2 - 1 = 0$

$\lambda^2 - 4\lambda + 3 = 0$

$= [\lambda - 3][\lambda + 1] = 0$

$= \lambda = 3, \quad \lambda = 1$

Eigen values are :

Find Eigen vector:

when $\lambda = 3$

$$\begin{bmatrix} 2-\lambda & 1 \\ 1 & 2-\lambda \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 2-3 & 1 \\ 1 & 2-3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$-x + y = 0$

$-x + -y = 0$

$-x = -y$

$+1 = -1$

$x = 1$ & $y = 1$

$\cancel{x + y = 0}$ Eigen vector $= \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

$x - y = 0$

$x = y$

$1 = -y$

$= -1$

when $\lambda = 1$

$$\begin{bmatrix} 2-\lambda & 1 \\ 1 & 2-\lambda \end{bmatrix} x = 0$$

$$\begin{bmatrix} 2-1 & 1 \\ 1 & 2-1 \end{bmatrix} x = 0$$

$$\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} x = 0$$

$x + y = 0$

$x = -y$ Eigen vector $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

$1 = -1$

Eigen vector:

$$= \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

2 Find the Singular value decomposition of

$$A = \begin{bmatrix} -4 & -7 \\ 1 & 4 \end{bmatrix}$$

SVD = $\boxed{A = U \Sigma V^T}$

$U = A \cdot A^T$

$$\begin{bmatrix} -4 & -7 \\ 1 & 4 \end{bmatrix} \cdot \begin{bmatrix} -4 & 1 \\ -7 & 4 \end{bmatrix}$$

$$= \begin{bmatrix} 65 & -32 \\ -32 & 17 \end{bmatrix}$$

$$\begin{bmatrix} 65 & -32 \\ -32 & 17 \end{bmatrix}$$

Find eigen value

$$\begin{bmatrix} 65-\lambda & -32 \\ -32 & 17-\lambda \end{bmatrix} = 0$$

$$\det = (65-\lambda)(17-\lambda) - 32^2 = 0$$

$$= \cancel{32}$$

$$= [1105 - 65\lambda - 17\lambda - \lambda^2] - 1024 = 0$$

$$= \lambda^2 -$$

$$= \cancel{82 + 48\lambda - \lambda^2}$$

$$= \cancel{\lambda^2 - 82\lambda + 81 = 0}$$

$$= 81 - 82\lambda + \lambda^2 = 0$$

$$= \lambda^2 - 82\lambda + 81 = 0$$

$$\lambda = 81 \text{ or } \lambda = 1$$

when $\lambda = 81$

$$\begin{bmatrix} 65 & -32 \\ -32 & 17 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 65-\lambda & -32 \\ -32 & 17-\lambda \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 65-81 & -32 \\ -32 & 17-81 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$= \begin{bmatrix} -16 & -32 \\ -32 & -64 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$= -16x + -32y = 0$$

$$-32x + -64y = 0$$

$$= -16x + -32y = 0$$

$$-x + -2y = 0$$

$$-x = 2y$$

$x = 1$ $\quad y = -\frac{1}{2}$

Eign vector $= \begin{bmatrix} 1 \\ -1/2 \end{bmatrix}$

when $\lambda = 1$

$$\begin{bmatrix} 65 & -32 \\ -32 & 17 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 65-\lambda & -32 \\ -32 & 17-\lambda \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 65-1 & -32 \\ -32 & 17-1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 64 & -32 \\ -32 & 16 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$64x + -32y = 0$$

$$x + -2y = 0$$

$$\cancel{x = -2y}$$

$$\cancel{2y = x}$$

$$y = 2 \quad \cancel{x = 1}$$

$$x + -2y = 0$$

$$x = 2y$$

if $x = 1$ $\quad y = 2$

eigen vector $= \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

$\lambda = 81$

Eigen vector in unit form

$$\begin{matrix} 1 \\ -1/2 \end{matrix}$$

$$= \frac{1}{\sqrt{1^2 + \left(-\frac{1}{2}\right)^2}}$$

$$= \frac{1}{\sqrt{1.25}} = 0.89$$

$$= \frac{-\frac{1}{2}}{\sqrt{1^2 + \left(-\frac{1}{2}\right)^2}} = \frac{-\frac{1}{2}}{\sqrt{1.25}} = \frac{\cancel{0.5}}{-0.4}$$

$$= \cancel{1.25}$$

$$= \frac{-0.5}{1.11} = -0.45$$

Unit form $= \begin{bmatrix} 0.89 \\ -0.45 \end{bmatrix}$

$\lambda = 1$

Eigen vector in unit form.

$$= \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\rightarrow \frac{1}{\sqrt{1^2+2^2}} = \frac{1}{\sqrt{1+4}} = \frac{1}{\sqrt{5}} = \frac{1}{2.23}$$

$$= \underline{\underline{0.45}}$$

$$\rightarrow \frac{2}{\sqrt{1^2+2^2}} = \frac{2}{\sqrt{1+4}} = \frac{2}{\sqrt{5}} = \frac{2}{2.23}$$

$$= \underline{\underline{0.89}}$$

$$= \begin{bmatrix} 0.45 \\ 0.89 \end{bmatrix}$$

$$U = \begin{bmatrix} 0.89 & 0.45 \\ -0.45 & 0.89 \end{bmatrix}$$

$$\Sigma = \begin{bmatrix} \sqrt{81} & 0 \\ 0 & \sqrt{1} \end{bmatrix} = \begin{bmatrix} 9 & 0 \\ 0 & 1 \end{bmatrix}$$

Find $V = ?$

$$\boxed{V = A^T \cdot A}$$

$$A^T A = \begin{bmatrix} -4 & 1 \\ -7 & 4 \end{bmatrix} \cdot \begin{bmatrix} -4 & -7 \\ 1 & 4 \end{bmatrix}$$

$$A^T \cdot A = \begin{bmatrix} 17 & 32 \\ 32 & 65 \end{bmatrix}$$

$$= \begin{bmatrix} 17-\lambda & 32 \\ 32 & 65-\lambda \end{bmatrix} = 0$$

$$\det\ (17-\lambda)-(65-\lambda) - 32^2 = 0.$$

$$= 1105 - 17\lambda - 65\lambda - \lambda^2 - 1024 = 0$$

$$= 81 - 82\lambda + \lambda^2 = 0$$

$$= \lambda^2 - 82\lambda + 81 = 0$$

$$\lambda = 81 \ \& \ \underline{\underline{\lambda = 1}}$$

When $\lambda = 81$

$$\begin{bmatrix} 17 & 32 \\ 32 & 65 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 17-\lambda & 32 \\ 32 & 65-\lambda \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 17-81 & 32 \\ 32 & 65-81 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$\cancel{-64x + 32y = 0}$

$$\begin{bmatrix} -64 & 32 \\ 32 & -16 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$-64x + 32y = 0$

$-x + 2y = 0$

$2y = -x$

$x = -1 \quad y = 2$

Eigen vector $= \begin{bmatrix} -1 \\ 2 \end{bmatrix}$

$-64x + 32y = 0$

$-64x = -32y$

$2x = y$

$x = 1, y = 2$

Eigen vector $= \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

Preplacement Program

India has witnessed rapid growth in recent years driven by the increase in new-age industries. India's youth are capable of standing out in the global marketplace and meeting the competitive standards necessary to get their desired jobs. Leading companies have already begun highlighting the shortfall in candidate quality and now face an unprecedented paradox of a high quantity-low quality applicant pool.

Objectives

- Equip the pre-final students on business communication and etiquette, group discussion, and interview skills, which will enable students to perform exceptionally well at group discussions and interviews (on-campus / off-campus) conducted by various companies.

Agenda

- Creativity & Problem Solving
- Assertiveness & Leadership
- Communication Skills
- Resume Preparation
- Group Discussion
- Mock GDs & Interview Skills

Automation Anywhere

Automation Anywhere is a leader in Robotic Process Automation (RPA), the platform on which the world's leading organizations build world-class Intelligent Digital Workforces. Automation Anywhere's enterprise-grade platform uses software bots that work side by side with people to do much of the repetitive work in many industries. It combines sophisticated RPA, cognitive, and embedded analytic technologies. More than 2,800 customer entities and 1,600 enterprise brands use this AI-enabled solution to manage and scale business processes faster, with near-zero error rates, while dramatically reducing operational costs. It also provides automation technology to leading financial services, insurance, healthcare, technology, manufacturing, telecom, and logistics companies globally. Automation Anywhere is a knowledge partner of the ICT Academy of Kerala and Automation Anywhere University is the learning program platform that has conducted more than 500,000 training and

Objectives

- To build familiarity & technology adoption.
- Fundamental level understanding of the tool & technology.

Agenda

- Hello Bot: Introduction to RPA
- Break the ICE: An introduction to creating your first bot
- Storing and Manipulating Data: How to Automate Database-related Processes
- Automating Excel Operations: Methods to Work with Excel Workbooks
- Working with PDF Documents: Methods to Automate PDF-Related Processes
- Unleash Your Intelligent Bots: Developing Cognitive Bots, driven by AI & Machine Learning
- Bot Story: Where Automation meets Analytics - Bot Insight

When $\lambda = 1$

$$\begin{bmatrix} 17 & 32 \\ 32 & 65 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 17-\lambda & 32 \\ 32 & 65-\lambda \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 17-1 & 32 \\ 32 & 65-1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} 16 & 32 \\ 32 & 64 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$16x + 32y = 0$

$x = -2y$

If $x = 1$

$y = \frac{-1}{2}$

Eigen vector $= \begin{bmatrix} 1 \\ -1/2 \end{bmatrix}$

Unit Eigen Vector

$\lambda = 81 : \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

$\rightarrow \dfrac{1}{\sqrt{1^2+2^2}} = \dfrac{1}{\sqrt{5}} = \dfrac{1}{2.23} = 0.44$

$\rightarrow \dfrac{2}{\sqrt{1^2+2^2}} = \dfrac{2}{\sqrt{5}} = \dfrac{2}{2.23} = 0.89$

$\begin{bmatrix} 0.44 \\ 0.89 \end{bmatrix}$

Ans Eigen vector in unit form

when $\lambda = 1$

$\begin{bmatrix} 1 \\ -1/2 \end{bmatrix}$

$= \dfrac{1}{\sqrt{1^2+\left(\frac{-1}{2}\right)^2}} = \dfrac{1}{\sqrt{1+0.25}} = \dfrac{1}{\sqrt{1.25}} = \dfrac{1}{1.11}$

$= 0.90$

$\dfrac{-1/2}{\sqrt{1^2+\left(\frac{-1}{2}\right)^2}} = \dfrac{\frac{-1}{2}}{\sqrt{1.25}} =$

$= \dfrac{-0.5}{1.11} = -0.45$

$\begin{bmatrix} 0.90 \\ -0.45 \end{bmatrix}$

Apply form of SVD

$A = U \cdot \Sigma \cdot V^T$

$U = \begin{bmatrix} 0.89 & 0.45 \\ -0.45 & 0.89 \end{bmatrix} \cdot \Sigma \begin{bmatrix} 9 & 0 \\ 0 & 1 \end{bmatrix} \cdot V^T \begin{bmatrix} 0.44 & 0.90 \\ 0.89 & -0.45 \end{bmatrix}$