# Does this conjecture lead us toward an absolute justice in the world?

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**https://emfps.blogspot.com/2018/02/a-model-to-produce-magic-matrix.html**

**The Impact of Stochastic Matrix on Any Vector**

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**A stochastic matrix shows us that the sum all elements on each column (or each row) is equal one or we can say that each column (or each row) of a stochastic matrix is just a probability vector.**

***Theorem (1): The sequence of operations a stochastic matrix on any vector will be finally obtained the constant vector. (The elements of vector are the members of Real Number)***

***V1 = V0 * M^1 , V2 = V1*M^2, V3 = V2*M^3, …. Vn+1 = V n* M^k***

***Where vector Vn+1 always will be the constant.***

***A special state is when the vector is a probability vector which is named Markov Chain or Markov Process***

**Example (1):**

**The sample of our vector (1*4) is:**

**V0 =**

| | | | |
|---|---|---|---|
| 0.73 | 0.32 | 0.09 | 0.56 |

**Suppose we have below stochastic matrix M (4*4):**

**M =**

| | | | |
|---|---|---|---|
| 0.11 | 0.18 | 0.48 | 0.23 |
| 0.23 | 0.13 | 0.31 | 0.33 |
| 0.12 | 0.72 | 0.06 | 0.1 |
| 0.15 | 0.45 | 0.03 | 0.37 |

**The results of the sequences (V0 * M) are as follows:**

| | | | | | | |
|---|---|---|---|---|---|---|
| V1 | M^1*V0 | 0.2487 | 0.4898 | 0.4718 | 0.4897 | 1.7 |
| V2 | M^2*V1 | 0.27008 | 0.6685 | 0.31421 | 0.4472 | 1.7 |
| V3 | M^3*V2 | 0.28825 | 0.563 | 0.36914 | 0.47961 | 1.7 |
| V4 | M^4*V3 | 0.27744 | 0.60668 | 0.34943 | 0.46646 | 1.7 |
| V5 | M^5*V4 | 0.28195 | 0.5903 | 0.3562 | 0.47155 | 1.7 |
| V6 | M^6*V5 | 0.28026 | 0.59615 | 0.35385 | 0.46974 | 1.7 |

**As we can see, the vectors of V5 and V6 are approximately the same.**

**<u>Example (2):</u>**

**The sample of our vector (1*4) is:**

**V0 =**

| | | | |
|---|---|---|---|
| 0.63 | 0.23 | 0.54 | 0.56 |

**The results of the sequences are as follows:**

| | | | | | | |
|---|---|---|---|---|---|---|
| V1 | M^1*V0 | 0.271 | 0.7841 | 0.4229 | 0.482 | 1.96 |
| V2 | M^2*V1 | 0.3332 | 0.6721 | 0.41299 | 0.54171 | 1.96 |
| V3 | M^3*V2 | 0.32205 | 0.68847 | 0.40932 | 0.54016 | 1.96 |
| V4 | M^4*V3 | 0.32392 | 0.68525 | 0.40877 | 0.54206 | 1.96 |
| V5 | M^5*V4 | 0.3236 | 0.68563 | 0.4087 | 0.54207 | 1.96 |
| V6 | M^6*V5 | 0.32365 | 0.68557 | 0.40866 | 0.54212 | 1.96 |

**As we can see, the vectors of V5 and V6 are approximately the same.**

**<u>An example for Markov Chain:</u>**

**The sample of our probability vector (1*4) is:**

**V0 =**

| | | | |
|---|---|---|---|
| 0.13 | 0.32 | 0.09 | 0.46 |

**I consider above stochastic matrix M (4*4).**

**Then, we will have below results:**

| Markov Chain | | | | | | Sum |
|---|---|---|---|---|---|---|
| V1 | M^1*V0 | 0.1677 | 0.3368 | 0.1808 | 0.3147 | 1 |
| V2 | M^2*V1 | 0.16481 | 0.34576 | 0.20519 | 0.28423 | 1 |
| V3 | M^3*V2 | 0.16491 | 0.35026 | 0.20713 | 0.27769 | 1 |
| V4 | M^4*V3 | 0.16521 | 0.34932 | 0.2085 | 0.27698 | 1 |
| V5 | M^5*V4 | 0.16508 | 0.34991 | 0.20841 | 0.2766 | 1 |
| V6 | M^6*V5 | 0.16514 | 0.34973 | 0.20851 | 0.27662 | 1 |

**As we can see, the vectors of V5 and V6 are approximately the same.**

***Is below conjecture is a theorem?***

***Conjecture (1): The sequence of operations for transpose of a stochastic matrix (n*n) with non - zero elements on any vector will be finally obtained a vector with the same elements. (The elements of vector are the members of Real Number)***

$$Vn + 1 = Vn \times (M^T)^k \rightarrow Vn + 1 = (a, a, a, \ldots\ldots)$$

*Note: If we have below equation:*

$$Vn + 1 = Vn \times (M^T)^k \rightarrow Vn + 1 = (a, a, a, \ldots\ldots)$$

*Then the vector should be (1*n) and the rows of stochastic matrix should be probability vectors.*

*If we have below equation:*

$$Vn + 1 = (M^T)^k \times V_n \rightarrow Vn + 1 = (a, a, a, \ldots\ldots)$$

*Then the vector should be (n*1) and the columns of stochastic matrix should be probability vectors.*

**Example (1):**

**Consider above stochastic matrix M (4*4):**

**M =**

| | | | |
|---|---|---|---|
| 0.11 | 0.18 | 0.48 | 0.23 |
| 0.23 | 0.13 | 0.31 | 0.33 |
| 0.12 | 0.72 | 0.06 | 0.1 |
| 0.15 | 0.45 | 0.03 | 0.37 |

**The transpose of matrix M is:**

MT =

| | | | |
|---|---|---|---|
| 0.11 | 0.23 | 0.12 | 0.15 |
| 0.18 | 0.13 | 0.72 | 0.45 |
| 0.48 | 0.31 | 0.06 | 0.03 |
| 0.23 | 0.33 | 0.10 | 0.37 |

**The sample of vector is:**

**V0 =**

| | | | |
|---|---|---|---|
| 0.63 | 0.23 | 0.54 | 0.56 |

**The results of the sequences are as follows:**

| | | | | | SUM |
|---|---|---|---|---|---|
| V0 * (Transpose M)^1 | 0.4987 | 0.527 | 0.3296 | 0.4214 | 1.7767 |
| V0 * (Transpose M)^2 | 0.40485 | 0.42445 | 0.5012 | 0.47776 | 1.80826 |
| V0 * (Transpose M)^3 | 0.4714 | 0.46133 | 0.43203 | 0.44354 | 1.80829 |
| V0 * (Transpose M)^4 | 0.44428 | 0.44869 | 0.459 | 0.45538 | 1.80735 |
| V0 * (Transpose M)^5 | 0.45469 | 0.45308 | 0.44945 | 0.45081 | 1.80803 |
| V0 * (Transpose M)^6 | 0.45099 | 0.45158 | 0.45283 | 0.45237 | 1.80777 |
| V0 * (Transpose M)^7 | 0.4523 | 0.45209 | 0.45166 | 0.45182 | 1.80787 |

**As we can see, the elements of vector V7 are the same.**

**Example (2):**

**The sample of vector is:**

**V0 =**

| | | | |
|---|---|---|---|
| 4.41 | 8.77 | 1.54 | 0.56 |

**The results of the sequences are as follows:**

| | | | | | SUM |
|---|---|---|---|---|---|
| V0 * (Transpose M)^1 | 2.9317 | 2.8166 | 6.992 | 4.8614 | 17.6017 |
| V0 * (Transpose M)^2 | 5.30376 | 4.81223 | 3.28542 | 3.7157 | 17.1171 |
| V0 * (Transpose M)^3 | 3.88123 | 4.09012 | 4.66995 | 4.43444 | 17.0757 |
| V0 * (Transpose M)^4 | 4.42465 | 4.33545 | 4.13427 | 4.20358 | 17.0979 |
| V0 * (Transpose M)^5 | 4.21837 | 4.25008 | 4.32089 | 4.294 | 17.0833 |
| V0 * (Transpose M)^6 | 4.29068 | 4.27923 | 4.25492 | 4.2637 | 17.0885 |
| V0 * (Transpose M)^7 | 4.26525 | 4.2692 | 4.27759 | 4.27447 | 17.0865 |

**As we can see, the elements of vector V7 are the same.**

**Eigenvalue equal to the sum of all elements on each column or row**

**One of the properties two ways matrices which can be easily proved is, to obtain the Eigenvalue where the sum of all elements on each column or row is equal to Eigenvalue of these matrices.**

**Another interesting property of a two way matrix is, to have a special eigenvector that all elements of it are the same. It means, if "M" is a two ways matrix, vector "V" will be eigenvector of matrix "M" where we have:**

**V = (x, x, x, x, ….) and $\lambda$ = the sum of all elements on each column or row**

**This property can be easily proved.**

**Following to article of "The Impact of Stochastic Matrix on Any Vector" posted on link: https://emfps.blogspot.com/2018/02/the-impact-of-stochastic-matrix-on-any.html , let me tell you about another conjecture as follows:**

***Conjecture (2): The final result of Markov Process including the impact of a two ways stochastic matrix on any vector will be a vector with the same elements where each element will be equal to average all elements of initial vector.***

***Initial Vector: V0 = (a, b, c, d,….) and M = two ways stochastic matrix***

$$V_1 = V_0 \times M$$

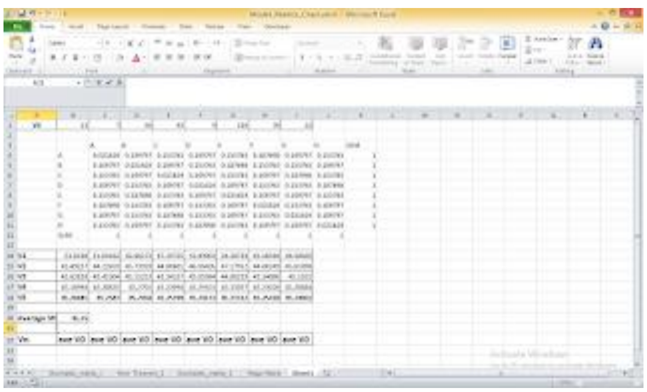
$$V_2 = V_1 \times M$$

$$V_3 = V_2 \times M$$

$$V_n = V_{n-1} \times M$$

$Vn = (x, x, x, x\ldots)$ *and* $x = Average\ (a, b, c, d\ldots)$

**Example:**



***Does this conjecture lead us toward an absolute justice in the world?***