



An Analytical Approach to Measure the Cultural Diversity Mutuality between two Communities

Rezza Moieni^{1*}, Peter Mousaferiadis², Prateek Pateel³

Abstract

For diversity to serve as a competitive advantage and for companies to be successful, the diversity of their workforce should be synchronized with the community they are doing business in. This degree of similarity in diversity of an organisation to its customer base is termed as Mutuality. High synchronization builds a healthy relationship between an organisation and its customers leads to better customer service, thus, radically improve their business performance. However, at present, this concept of diversity & mutuality has been analytically neglected and most organisations in both the public and private sectors are grappling with this aspect. Thus, the goal of this research is to design an empirical formula for the Mutuality Index by using the method of cosine similarity which captures the orientation (the angle) of one attribute of diversity in an organisation with its customer base and determines the similarity between them. The research explains how this data-driven approach can help organisations become better at measuring, understanding, tracking and delivering more informed and better diversity strategies which eventually enhances their business performance and induces a stronger bottom line (Profits).

Key Words: Diversity, Mutuality, Mutuality Index, Diversity Atlas, Ethnicity, Worldviews, Cosine Similarity.

DOI Number: 10.14704/nq.2022.20.6.NQ22013

NeuroQuantology2022;20(6):105-120

105

Introduction

Cultural diversity within organisations can provide a rich pool of diverse thoughts, different viewpoints, and various approaches to resolving new problems, thus fostering innovation, problem-solving and business productivity (Lorenzo et al., 2017; Planigale, 2019). In order to optimize these benefits, an organisation needs to become competent across three dimensions: Diversity, Mutuality and Inclusion (Healthwest, 2020). Diversity refers to the disparity in the variety of attributes that people in an organisation possess, such as their language, ethnicity, worldviews, education level, ancestry, and so on. Inclusion is the extent to which these people receive fair and equitable opportunities. Mutuality, on the other hand, is the degree to which the diversity of an organisation reflects the diversity of its customer base. The aspects of diversity and its importance have been well documented, however, these aspects have been analytically neglected due to a

substantial gap in the knowledge about how diversity is measured within organisations. No matter how sophisticated a technology an organisation adopts, success can only be achieved if it accurately serves the needs of its customers. Thus, every organisation consistently strives to enhance its customer experience by improving the quality of their service delivery. This is where the concept of 'Mutuality' comes into play. Recent research indicates that clients are more likely to trust staff from their own communities (Healthwest, 2020). Likewise, leveraging staff's language skills, networks and understanding of global cultural environments ensure greater appreciation and better responses to what their customers actually need. This two-way relationship between an organisation and its customers has immense potential to radically improve their business performance.

Corresponding author: RezzaMoieni

Address: ^{1*}Cultural Infusion, Australia; ²University of Melbourne, Australia; ³Cultural Infusion, Australia.

E-mail: ^{1*}Rezza.m@culturalinfusion.org.au; ²Prateekpatil237@gmail.com; ³Peter.m@culturalinfusion.org.au



At present, however, most organisations in both the public and private sectors are struggling to achieve mutuality. Their internal diversity does not align with the breadth of the community in which they operate, and this mismatch has proven to be a major obstacle to the quality of their services.

Therefore, the purpose of this research is to uncover the trends in the organisation's diversity and help them recognize the shortcomings in their interface with clients, customers, and stakeholders due to the mutuality mismatch. This will be achieved by developing an empirical formula for the Mutuality Index which measures the mutuality of an organisation by benchmarking it directly against the diversity of the community. This insightful data helps to explore more business opportunities and tracks the progress of the organisation's performance as it relates to workforce mutuality. Based on this analysis, the company can also develop its hiring and inclusion strategies accordingly. This will guide organisations to focus their efforts on unleashing their full potential with greater precision and confidence.

Our research thus, begins with a literature review to explain the benefits of mutuality and then assesses different methodologies to analytically measure the mutuality of any organisation with its client community. The next section provides a few case studies and real-world scenarios to explain why cosine similarity is the most feasible method to determine the 'Mutuality Index'. The research then concludes with a brief overview on how the proposed data-driven approach can assist organisations to make informed and better diversity strategies which eventually enhances their business performance.

Literature Review

The United States Census Bureau reports that minorities accounted for around one-third of the population of the United States in 2005. Hispanics are the largest (14.4%) and fastest-growing minority (+ 21% since 2000), led by Blacks (12.2%) and Asians (4.2%) (Kronholz, 2006). Census projections predict that White Americans will no longer be the majority in 2044 (Frey, 2014). Similarly, from the data acquired through the 2016 Census by the Australian Bureau of Statistics, it is evident that the country of birth of 33.4% of the population was not born in Australia and 27.3% were non-English speakers. This shift in demographics strongly indicates that the entire Australian community and world in general, is

growing increasingly diverse as time goes on. More diverse populations, however, mean new challenges for organisations.

Research has demonstrated time and time again that diverse teams perform better than homogenous teams (Hunt et al., 2015; Hunt et al., 2018; Nair & Vohra, 2015). Being diverse undoubtedly fosters problem-solving by introducing a variety of ideas, however, this alone does not necessarily build employee commitment, motivation, reduce conflicts or improve customer satisfaction (Jayne & Dipboye, 2004). Additionally, research has shown that dissimilar employees might often be associated with lower commitment to the organisation, express less satisfaction, perceive more discrimination, and display a variety of other negative behavioural and attitudinal consequences (Riordan, 2000; Williams & O'Reilly, 1998).

In an era marked by high customer expectations, global competition, and rapid technological change, mutuality is the thread that binds an organisation and its customers together (SLA, 2019). Thus, for diversity to serve as a competitive advantage and for companies to be successful, the diversity of their workforce should be relational to the diversity of the community they are doing business in. For example, diversity must be combined with the concept of mutuality (McCuiston et al., 2004; Hunt et al., 2015; Forbes insights, 2011). Furthermore, Konrad (2003) states that workforce mutuality results in more jobs and career opportunities for people from diverse backgrounds, thereby achieving more equitable employment outcomes for all. This also increases the chance of improving the talent pool by recruiting the best employees as it is estimated that 67% of people consider diversity and mutuality as an important factor while deciding where to work (Hunt et al., 2018; Bond, 2007).

Significant advantages of workforce mutuality in other sectors are set out below:

Benefits in Health-care

In the last decade, a shift in demographics along with disparities in health care has contributed to a drop in patient satisfaction (Morey, 2018). Furthermore, cultural barriers and issues of ethnic distrust, social injustice and marginalization in nurse-patient interactions have also been widely documented in numerous research papers. These social breakdowns have resulted in more instances of illness and disconnection from well-being



programs. Individuals can only be deemed to have equity in health when the avoidable barriers that prohibit them from enjoying the same quality of health services as compared to other individuals in the community are abolished (WHO, 2018; Braveman&Gruskin, 2003). As health is a fundamental human right, it is crucial to reduce health inequities.

With the current diversity and transformation of demographics across the world, there also arises an unprecedented opportunity to make a difference in how one sees the world, how healthcare organisations provide care to their patients, and how clients trust organisations in return. It is imperative for healthcare professionals to exhibit awareness, respect and appreciation for a variety of cultures in order to provide high-quality care across settings (American Association of Colleges of Nursing, 2015, para 2; Madera, 2013). The concept of mutuality could ensure this by broadening both the workforce's and the patients' perspectives (Campbell &Gregor, 2002).

More importantly, in addition to this, customers and clients are more likely to trust staff from their own communities and feel comfortable coming to the organisation for care. Research has suggested that there is an improvement in all sorts of health outcomes when the diversity of health professionals such as doctors, nurses and other allied health practitioners better reflects the diversity of the communities they serve (Healthwest, 2020). This is because workforce mutuality promotes good business sense by facilitating a better and deeper understanding of the needs and concerns of patients. This ensures all the social and health services are more adaptable and universally responsive to all members of the community (Spevick, 2003; ECCV, 2014; Cohen et al., 2002; Williams et al., 2014; Lewis et al., 2014). When an organisation provides this sense of trust and sustainably builds the patients' loyalty in the long run, it eventually leads to improved outcomes and enhances the organisation's market position (Chyna, 2001; Morey, 2018; HealthWest, 2020). Therefore, understanding the demographics of the community that an organisation serves and accordingly diversifying its workforce is an essential strategy to minimize health disparities, and achieve equity with enhanced access to quality health care for all populations (Williams et al., 2014; Philips & Malone, 2014).

Benefits in Retail

According to the Minority Business Development Agency (1999), the actual buying power of minority groups in the US alone amounts to around one trillion dollars and this will continue to increase substantially over the next 50 years. As the global economy grows, the minority population increases and income differences between minorities and non-minorities are likely to decrease. It is therefore necessary to keep customer bases wide and open. It is already widely understood that diversity in the workplace is advantageous because it results in a variety of viewpoints and ideas thus results in more innovative problem-solving (Hunt et al., 2018; Madera, 2013). In addition, research published by various academic journals has revealed a similar correlation between the diverse demographics of shoppers and the diversity of retail employees.

The American Sociological Association (2009) highlights the high-business-impact approach, "customer reflection diversity". They point out that a workforce with diversity in key areas that reflect its customer base will significantly increase sales and also improve customer loyalty. For instance, Americans with disabilities have an estimated \$544 billion in disposable income, and organisations that employ workers with disabilities will have greater insight into the services and products that fit the needs of that customer base (Kennedy & Jain, 2019; Bond, 2007; Gaudiano & Hunt 2016; Kimberlee, 2019). Paul et al. (2011) also explored racial diversity in retail and this study determined that with each percentage point closer to a perfect match between the diversity of shoppers and stores, a retailer could boost its sales revenue by \$67,000. Research also indicates that people shop on the basis of their own values and beliefs. In a broad survey of shoppers across Canada, the United States and the United Kingdom, 42% of ethnic minority shoppers and 41% of LGBT shoppers indicated that they would turn to a retailer dedicated to diversity and inclusion, while 55% overall would step away from retailers who deal poorly with negative diversity and inclusion incidents (Standish et al., 2019; Hunt et al., 2015).

In addition to aligning with customer preferences, a strong connection between employee and customer demographics may improve performance by reducing communication costs among people of the same racial, ethnicity, gender, or age group (Leonard et al., 2004). Being empathetic and understanding customer's cultural backgrounds enhances customer relationships and reduces



stress levels among customers and the service staff (Slater et al., 2008; Australian Multicultural Foundation, 2010; Memon, 2019). This assumption is based on the empirical evidence that suggests there is a higher likelihood of positive interactions between similar people than dissimilar people (Churchill & Collins, 1975; Schueffel & Istria, 2005; Gulati, 2010; Sullivan, 2017; Lafferty, 2017). Consequentially, when customers find employees to be more approachable, they begin to have a high degree of comfort and thus, their trust in employees grows. On the other hand, employees are likely to have an easier time understanding customer preferences and how they evolve over time. They may also attract customers through their connections within the community. Thus, in many cases, employees' social ties increase the overall customer service scores and significantly help to attract and retain customers (Schmitt, 2010). Similarly, when the diversity of a product development team also matches the diversity of its targeted customers, it increases the level of insight one can bring to the product. It improves understanding of how different populations respond to what the organisation is building and improves communication in terms of feedback from the customers. Therefore, products and service processes will more likely align and fit the needs of customers (Lafferty; 2017; SLA, 2019, Gulati, 2010). In addition to retail and other B2C industries, this also holds true for many other sectors such as banks, education, restaurants, and others.

Data-driven Approach

Now that an in-depth understanding of the advantages of mutuality has been established, it is necessary to discuss its implementation. The major constraint for every organisation to incorporate diversity, inclusion and mutuality strategies is the evaluation of cost versus benefits. It is estimated that organisations spend \$8 billion annually on diversity training (Hansen, 2003; Madera, 2013) but are unfortunately poor at assessing the performance and effectiveness of diversity initiatives (Hunt et al., 2018). Kochan et al. (2003) report that none of the 20 large and well-known Fortune 500 companies contacted for their analysis had systematically examined the impact of their diversity initiatives and the most likely reason for this is a substantial gap in the knowledge about how diversity is analytically measured in an organisation. Currently, due to the lack of field research, data-driven approaches haven't been

incorporated and little is known about the relative merits for diversity initiatives (Jayne & Dipboye, 2004).

Establishing metrics and evaluating the effectiveness of diversity initiatives will allow organisations to make accurate data-driven decisions. This will ensure early identification of issues and accordingly help to efficiently leverage scarce resources to areas that will benefit most, thus avoiding costly outcomes. Therefore, insightful data allows the organisation to track progress and helps to explore business opportunities. Additionally, data provides evidence to help an organisation know that it has reached its target. Thus, the goal of this research is to design an empirical formula for the Mutuality Index to measure the mutuality of an organisation by benchmarking its diversity directly against that of its community.

Hypothesis

From the previous sections, we now understand that mutuality is the degree of diversity matching between two objects. The extent of diversity matching can be estimated by measuring the similarity between them, for example, how much alike the two objects are. To discover the overall mutuality index of any organisation, the degree of similarity has to be determined across all the four pillars of diversity. They are: Country of birth, Ethnicity, Worldview and language of the employees in an organisation against the customers in their client community. Usually, in the machine learning world, the similarity score is measured in the range of [0, 1].

Therefore, there can be two main considerations of similarity:

If X = organisation and Y = client community,

Similarity = 1 if X = Y

Similarity = 0 if X ≠ Y

To choose the best and most feasible method, a few popular formulas to measure the similarity between two vectors are studied and evaluated below:

1. **Manhattan/City block Distance:** is a metric wherein the distance between two points is calculated as the sum of the absolute differences of their Cartesian coordinates. The Manhattan distance between two points A and B is determined by adding up the absolute x-axis and y-axis variability of those two points. In other words, it is simply the total sum of the



difference between the x-coordinates and y-coordinates (Ladd, 2020).

For instance, in a plane with point A at (x1, y1) and point B at (x2, y2),
 Manhattan distance = $|x1 - x2| + |y1 - y2|$

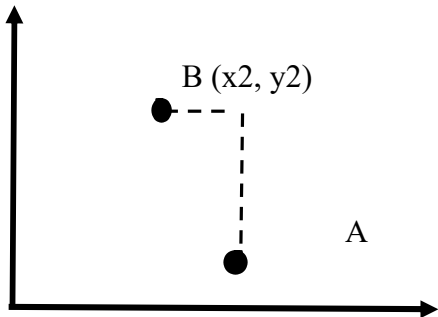


Figure 1. Representation of two points in a plane to determine the Manhattan Distance between them

This is a quick and easy way to compute, and is quite straightforward to understand but the result may not always be the shortest distance between the two paths because it might not be a straight line, it can chop and change both ways horizontally and vertically. Therefore, it is less accurate and not useful for data and text analysis.

2. Euclidean distance: The Euclidean distance between two points is the length of the path connecting them. In this case, the Pythagorean theorem gives this distance between two points.

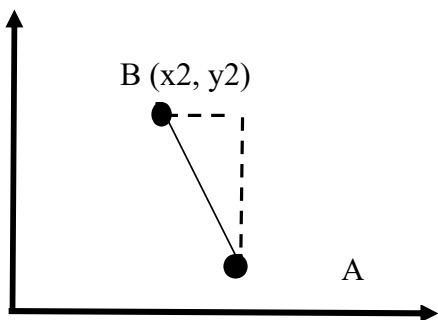


Figure 2. Representation of two points in a plane to determine the Euclidean Distance between them

Therefore, following the theorem, distance is determined by calculating the root of square

differences between the coordinates of a pair of objects (Agrawal et al., 2012). Supposing point A(x1, y1) and B(x2, y2) are two points in a plan as shown above, the distance between them is given by:

$$C = \sqrt{(A^2 + B^2)} = \sum \sqrt{(xi - yi)^2}$$

When data is dense or continuous, this is the best proximity measure.

The city block distance and Euclidean distance are similar because both methods evaluate the degree of similarity by measuring the distance between the two points or vectors. If the distance between these points is small, then the two vector objects have a high degree of similarity and, conversely, if the distance is large, the degree of similarity is low (Ladd, 2020).

These two methods are acceptable when calculating the physical distance between the two vectors, but they do not give the normalized value. It can give values over 1 too which makes it difficult to derive meaningful insights about the organisation (Goswami et al., 2018). No doubt the greater the value, the farther the two vectors are but it is not possible to compute how exactly similar or dissimilar they are, how much improvement has been made. It is not feasible to analyse and track the performance of the organisation in terms of its diversity matching with the client community. In other words, there is no standard benchmark that can be decided based on the results obtained from Manhattan and Euclidean distances.

Furthermore, these two methodologies largely depend on the magnitude of the two vectors. They are both concerned with the lengths of lines between two points and the vectors with the largest variable value greatly influence the result (Ladd, 2020). For example, with a customer size of 1000, if the country of birth of the 100 of them is Australia. On the other hand, in an organisation of size 100, if the country of birth of 10 of them is Australia, the distance calculated between them using Euclidean and Manhattan method is large. In reality however their similarity ratio is high. Therefore, although the two methods can be used to find the physical distance between the two vectors, they are not suitable to find the similarity between the two vectors or datasets (Goswami et al., 2018).

3. Cosine Similarity: In recent years, interest in computing “cosine similarity” for different



application domains has increased. Cosine similarity between two vectors corresponds to their dot product divided by the product of their magnitudes. If x and y are vectors as defined above, their cosine similarity is given by:

$$\cos\theta = \frac{x \cdot y}{\|x\| \cdot \|y\|}$$

This can potentially be deployed as a measure of similarity between two vectors of an inner product space by measuring the cosine of the angle between them [42]. As it is known, the cosine of 0° is 1, and it is less than 1 for any other angle. It is therefore a judgment of orientation and not magnitude. This means that two vectors with the same orientation have a Cosine similarity of 1 because the two vectors overlap each other in the positive space. They have the same orientation and are superimposed on one another. On the contrary, two vectors at 90° have a similarity of 0, independent of their magnitude. Cosine similarity is particularly used in positive space, where the result is meticulously bounded in $[0,1]$ (Kotu& Deshpande, 2019).

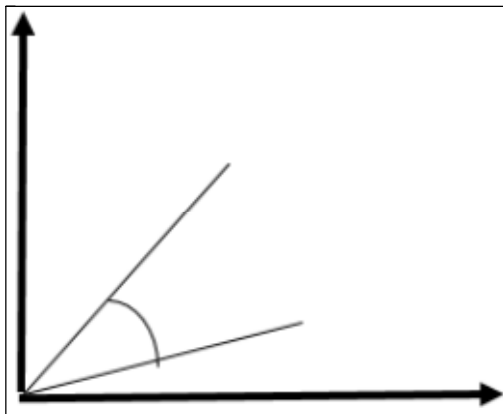


Figure 3. Representation of two vectors in a plane to determine the Cosine Similarity between them.

Cosine similarity can be adapted to any number of dimensions and is most prevalently used in high-dimensional positive spaces. When plotted on a multi-dimensional space, where each dimension corresponds to one of the four different diversity attributes (say, country of birth or ethnicity or worldviews or the language), the cosine similarity captures the orientation (the angle) of that attribute and not their magnitude. This methodology measures whether the relationship among these features between an organisation and its client community is the same, regardless of how much of any one attribute (?) is present. It is less

affected by the magnitude of the two vectors. In the above example, irrespective of the magnitude, it shows the similarity between the two vectors by calculating the angle between them (Ladd, 2020). The larger the angle, the less similar they are and vice versa.

To validate the feasibility of the Cosine Similarity for our case, a few samples are neatly analysed in the section below.

Case Study

Count ry of Birth	Organisa tion	Client Commu nity 1:	Client Commu nity 2:	Client Commu nity 3:
Austra lia	50	500	5	70
India	20	200	5	100
China	10	100	300	250

The extraction of the sample data of the organisation and client community is as shown in the table below. Considering one of the four pillars, that is the country of birth of the employees in an organisation and the Customer base they serve, the following conclusions can be made.

In the first example between the organisation and the client community 1, the cosine similarity is calculated as illustrated below:

$$\cos\theta = \frac{(50)(500)+(20)(200)+(10)(100)}{\sqrt{(50^2+20^2+10^2)} \cdot \sqrt{(500^2+200^2+100^2)}} = 1.00$$

The final value is 1.00. Therefore, the angle between the two vectors, Organisation and customer base, $\theta = 0^\circ$. This means that the organisation vector and Customer base vector lie one over the other with zero distance between them. Thus, it is evident that the diversity of the organisation is perfectly reflective of the diversity of its customer base. This is because the ratio of the number of Australians, Indians and Chinese in the organisation is exactly equal to the ratio of the number of Australians, Indians and Chinese in the community they serve. Thus, the diversity in one aspect (Country of Birth) is completely matching the diversity in the customer base. Synchronization in one attribute of diversity between the two is one hundred percent.



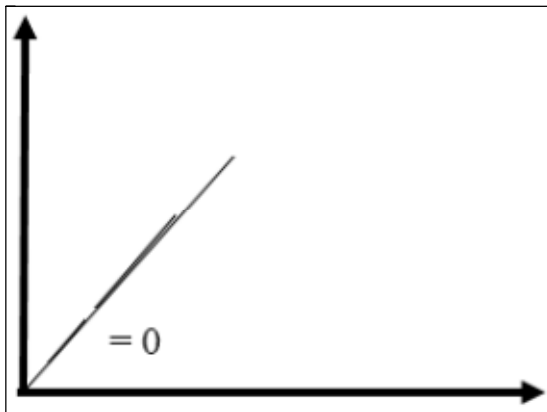


Figure 4. Case Study1 – The cosine of the angle between Organisation & Client Community 1 is 0

Furthermore, in the second case study, between the same organisation and the client community 2, the cosine similarity is:

$$\cos\theta = \frac{(50)(5)+(20)(5)+(10)(300)}{\sqrt{(50^2+20^2+10^2)} \cdot \sqrt{(5^2+5^2+300^2)}} = 0.20$$

The value of cosine similarity, in this case, is very low. The mismatch in the diversity between the organisation and its customer base is clearly evident in this case. There are only 5 Australians and 5 Indians in the community as compared to 50 and 20 in the organisation. Thus, the corresponding similarity score is only 0.20. Graphically, the angle between the organisation vector and client community 2 vector is 78.4°. The level of synchronization in the diversity between the two is not great and needs to be improved.

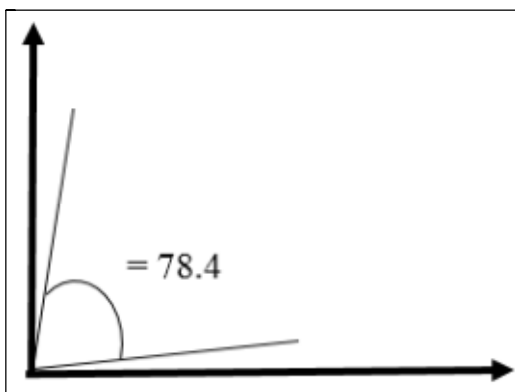


Figure 5. Case Study2 – The cosine of the angle between Organisation & Client Community 2 is 78.4

Similarly, in case if the country of birth of people in the organisation and client community is totally different, supposing there is no mutual country between them at all, then the cosine similarity will be zero. This is because the dot product of the two vectors, for example, the numerator will be zero. This means that the angle between them in the

positive space is 90°. When the angle is 90°, it is inferred that there is no mutuality between the organisation and its client community. They are totally dissimilar. To improve the business performance of such organisations, the mutuality has to drastically increase. This suggests that the company needs to hire employees that accordingly match the diversity of the community they are doing business in.

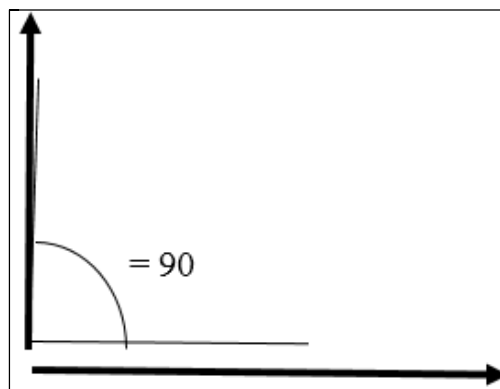


Figure 6. Case Study2 – When the cosine of the angle between Organisation & Client Community is 90

Lastly, in the third case study, the diversity of the organisation is half-matching to that of the community they serve to. Synchronization between the two is moderate. The cosine similarity backs this claim as the value is approximately 0.5. This means that the mutuality of the organisation is middling and with little effort and accurate tracking measures, with the increase in diversity matching, their business performance can be enhanced. The evaluation is as shown:

$$\cos\theta = \frac{(50)(70)+(20)(100)+(10)(250)}{\sqrt{(50^2+20^2+10^2)} \cdot \sqrt{(70^2+100^2+250^2)}} = 0.52$$

The angle between the two vectors here is approximately 60°.

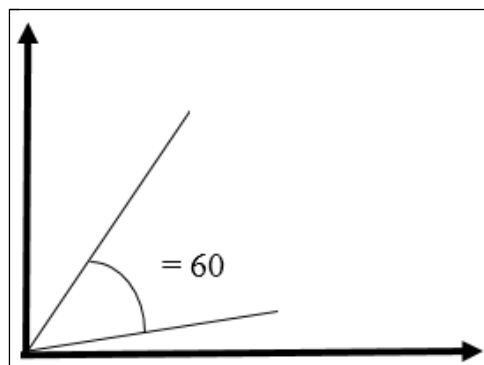


Figure 7. Case Study3 – The cosine of the angle between Organisation & Client Community 1 is 60



Next, in the same manner, cosine similarity for the other three pillars ethnicity, worldviews and language must be estimated. Then finally, the average of all these four cosine similarities yields the overall “Mutuality Index” of the organisation.

Implementation & Results

“Python” programming language and “Pandas” library functions have been selected to code the entire formula of cosine similarity to determine the ‘Mutuality Index’ between an organisation and the clients. Two examples have been implemented to validate the efficiency of the code and the pseudo-code has been enclosed in the appendix section.

Example 1

In the first example, the large excel datasheet which contained demographic details of around 260 citizens was fragmented into two parts. The first 130 individuals were considered as one unit and the next half were chosen as another unit. Unit 1 is considered as the ‘Organisation’ and Unit 2 is contemplated as its ‘Client Community’ (Customer base). These two excel sheets were read into the python code by implementing pandas’ libraries and the Mutuality between the two units with respect to their Country of birth, Ethnicity, Worldview, and Language was computed.

To start with the snapshot of the top 5 countries of birth of individuals for both the units were examined first:

Unit 1:		Unit 2:	
Country of Birth	Count	Country of Birth	Count
Australia	89	Australia	36
India	11	India	12
United Kingdom	5	United Kingdom	6
China	3	China	4
United States	2	United States	6

It is evident that the ratio of people belonging to one country from the first unit to the same country of the second unit is almost unanimous. The orientation of these two units is quite similar and thus, mutuality between the two units concerning the first pillar i.e., COB (Country of Birth) should be high. This result is validated by computing the cosine similarity function for the two units and the answer accurately turns out to be 0.898.

When mutuality is determined for ‘Ethnicity’ between the two units, the resulting score is very

low. This is because the cosine similarity is only 0.055. The answer is backed up with the evidence of the top 5 ethnicities of the two units which are entirely different.

Unit 1:		Unit 2:	
Ethnicity	Count	Ethnicity	Count
American	6	Persian	16
Aimaq	4	Anglo	6
Peruvian	1	Greek	5
Ishkashimi	1	Chinese	4
Gujar	1	Abaga	3

In contrast, the mutuality for ‘Worldview’ and ‘Language’ is very high. This is because the top 5 worldviews and languages of individuals belonging to both units are comparatively the same. The cosine similarity for these two are 0.983 and 0.845 respectively. When the two vectors w.r.t these two attributes are graphically represented in the positive dimensional space, the angle between them is minute. They are almost overlapping one another. The snapshot of the two datasets is exhibited below:

Unit 1:		Unit 2:	
Worldview	Count	Worldview	Count
Christianity	49	Christianity	57
Atheism	9	Atheism	14
Hinduism	10	Hinduism	13
Islam	7	Islam	4
Buddhism	6	Buddhism	4

Unit 1:		Unit 2:	
Language	Count	Language	Count
English (Australia)	87	English (Australia)	40
English (International)	13	English (International)	28
Punjabi (India)	3	Punjabi (India)	0
Laha (Viet Nam)	3	Laha (Viet Nam)	0
Hindi	3	Hindi	1

Finally, the mutuality index is estimated by taking the average of all the four cosine similarities, for example:

$$\text{Mutuality Index} = \frac{\sum_{i=1}^4 MI(i)}{4} = \{MI(COB) + MI(Eth) + MI(WV) + MI(Lang)\} / 4$$

$$\text{Mutuality Index} = (0.898 + 0.055 + 0.983 + 0.849) / 4 = 0.696$$

As the mutuality index score is approximately 0.7, it is inferred that the diversity of Unit 1 (Organisation) has good matching with that of the



diversity of Unit 2 (Client Community). To optimize the results to their best in order to maximize their business performance, however, there is room for improvement in the Mutuality Index. The ethnicity matching of Unit 1 (organisation) could be enhanced. Hence, Unit 1 can then strategize their recruitment process accordingly. In this case, they could aim to hire more employees who are Persian, Greek, Anglo or Chinese. This will increase the cosine similarity for Ethnicity and thus, increase their 'Mutuality Index' and eventually enhance their business productivity.

Example 2

In the second example, the whole Excel spreadsheet that contains sensitive and detailed information of

around 260 individuals is defined as the 'Organisation'. The information elicited from the previous Census in the USA, the total population of 327.2 million is treated as the 'Client Community' on the whole (US Census Bureau, 2001).

Firstly, the countries of birth of employees from the organisation is compared to that of the individuals residing in the United States of America. The cosine similarity between the two is 0.064. This is because most of the employees belong to Australia and individuals from the client community are largely born in America. The next top countries of birth of the two units are also eminently different. Thus, the mutuality index for 'COB' (Country of Birth) is very low. The snapshot of the top 10 countries is depicted below:

Organisation		Client Community	
Country of Birth	Count	Country of Birth	Count
Australia	125	America	278,600,000
India	23	Mexico	11,200,000
Aland Islands	12	China	2,800,000
United Kingdom	11	India	2,600,000
China	7	Philippines	2,000,000
United States	8	Salvador	1,400,000
Austria	3	Vietnam	1,300,000
New Zealand	3	Cuba	1,300,000
Pakistan	3	Coree du Sud	1,000,000
Japan	3		

Similarly, the cosine similarity for 'Ethnicity' and 'Language' are also very low, 0.001 and 0.023 respectively. The reason for the low score is understandably the same, their respective ethnicities and the languages they speak are comparatively distinct. Thus, when the two vectors

are graphically represented in the positive space, the angle between them is large due to the difference in their orientation. This is evident from the snapshots captured from the insightful data of the two communities.

Organisation		Client Community	
Ethnicity	Count	Ethnicity	Count
Persian	16	American	240,000,000
American	7	African	41,227,200
Anglo	6	Asian	15,705,600
Greek	5	Abnaki	2,944,800
Chinese	4	multiracial	9,488,800
Aimaq	4	Oceanic	654,400
Abaga	3	Americans	



Language	Count	Language	Count
English (Australia)	127	English (United States)	231,000,000
English (International)	41	Spanish	37,000,000
Hindi	4	Mandarin Chinese	3,000,000
Punjabi (India)	3	French	2,000,000
Laha (Viet Nam)	3	Laha (Viet Nam)	1,400,000

Contrastingly, the cosine similarity in the Mutuality Index for 'Worldview' has a high score of 0.893. 'Christianity' is largely being followed in both the communities and the ratio of the next two highest religious beliefs 'Hinduism' and 'Buddhism' is also relatively identical. Thus, the two vectors almost superimpose over one another when represented in the positive dimensional space.

Organisation Client Community

Worldview	Count	Worldview	Count
Christianity	106	Christianity	231,003,200
Atheism	23	Judaism	6,216,800
Hinduism	23	Islam	2,944,800
Islam	11	Buddhism	2,290,400
Buddhism	10	Hinduism	2,290,400

Finally, the overall Mutuality Index of the organisation is computed using the same formula as explained in the previous example.

$$\text{Mutuality Index} = \frac{\sum_{i=1}^4 MI(i)}{4} = \{MI(COB) + MI(Eth) + MI(WV) + MI(Lang)\} / 4$$

$$\text{Mutuality Index} = (0.064 + 0.001 + 0.884 + 0.023) / 4 = 0.243$$

As a result, the reason for the low 'Mutuality Index' is easily comprehensible. The two communities are vastly dissimilar. To enhance the business performance of the organisation, there is a compelling need to match the diversity of the organisation to that of the community they do their business in.

When the following details and the respective Mutuality Index score is exported on to our comprehensive Data Visualisation tool, Diversity Atlas, intuitive and aesthetical dashboards are generated automatically. Therefore, this data-driven approach can then help organisations become better at measuring, understanding, tracking and delivering more informed and better diversity strategies which eventually enhances their business performance and induces a stronger bottom line (Profits).

Conclusion

This study is a sound contribution towards the practice of embracing cultural diversity and unlocking its benefits. The paper explains how reflection of organisation's diversity to communities' diversity ultimately enhances their business performance. A data-driven approach is proposed by implementing the method of cosine similarity to assign the 'Mutuality Index' score to any organisation. This analytical score helps the organisation to track their current position in terms of workforce mutuality and understanding how much they can improve. Hence, organisations can then base their recruitment strategy accordingly. The focus of the research was on the four main pillars: Country of birth, worldviews, ethnicity and language. Thus in future work, we would want to broaden the concept of mutuality by applying it to other demographic fields like disability, gender, level of education, age, among others. The index that is developed measures the similarity between two units, however the idea to measure disparity and the distance between different elements should also be included in the formula.

Acknowledgement

This research was performed at Cultural Infusion PTY Ltd head office based in Melbourne, Australia. We thank, all Cultural Infusion staff for their continuous support, especially Mr Michael Walsmsley, Quincy Hall, Nabi Zameni, and Kevin Porter for their constant support. We would also like to thank University of Melbourne for providing an opportunity to Mr. Prateek Patil. Finally, thanks to Mr. Alex Chung who provided little insights and expertise that greatly assisted the research and Ms Jane Felstead for her editing assistance.

References

Agrawal, J., Patidar, A.K., & Mishra, N. (2012). Analysis of Different Similarity Measure Functions and their Impacts on Shared Nearest Neighbor Clustering Approach, International Journal of Computer Applications, 40(16). DOI:10.5120/5061-7221

American Association of Colleges of Nursing. (2015). Fact Sheet: Enhancing diversity in the nursing workforce.



- <http://www.aacn.nche.edu/media-relations/diversityFS.pdf>
- American Sociological Association (2009). Diversity Linked to Increased Sales Revenue and Profits, more Customers. ScienceDaily. <https://www.sciencedaily.com/releases/2009/03/090331091252.htm>
- Australian Bureau of Statistics (2016). Census 2016. https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/2?opendocument
- Australian Multicultural Foundation (2010). Managing Cultural Diversity: Training Program Resource Manual.
- Bond, M.A. (2007). Workplace chemistry: Promoting diversity through organisational change, University Press of New England. <http://www.upne.com/1584656522.html>
- Braveman, P., & Gruskin, S. (2003). Defining equity in health. *Journal of Epidemiology & Community Health*, 57(4), 254-258. <https://jech.bmj.com/content/57/4/254.short>
- Campbell, M., & Gregor, F. (2002). Mapping social relations: A primer in doing institutional ethnography. Aurora, Ontario: Garamond Press.
- Churchill, G.A., Collins, R.H., & Strang, W.A. (1975). Should Retail Salespersons Be Similar to Their Customers? *Journal of Retailing*, 51(3), 29-79. <https://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=b34a434f-9b0a-4ca0-99d5-ddd204a50db1%40pdc-v-sessmgr02>
- Chyna, J.T. (2001). Mirroring your community: A good reflection on you. *Healthcare Executive*, 16(2), 18-24. <https://elibrary.ru/item.asp?id=6033988>
- Cohen, J.J., Gabriel, B.A., & Terrell, C. (2002). The case for diversity in the health care workforce. *Health affairs*, 21(5), 90-102. www.healthaffairs.org/doi/full/10.1377/hlthaff.21.5.90?url_ver=Z39.88-2003&rft_id=ori:rid:crossref.org&rft_dat=cr_pub%20%200pubmed
- Ethnic Communities' Council of Victoria Inc. (ECCV). (2014). Work Solutions: Improving Cultural Diversity and Inclusion in the Workplace. <https://www.voced.edu.au/content/ngv:62318>
- Forbes Insights. (2011). Global Diversity and Inclusion: Fostering Innovation Through a Diverse Workforce. https://images.forbes.com/forbesinsights/StudyPDFs/Innovation_Through_Diversity.pdf
- Frey, W.H. (2014). New Projections Point to a Majority Minority Nation in 2044. *The Avenue - Brookings*. <https://www.brookings.edu/blog/the->
- Goswami, M., Babu, A., & Purkayastha, B.S. (2018). A Comparative Analysis of Similarity Measures to find Coherent Documents, *International Journal of Management, Technology and Engineering*, 8(11), 786 – 798. <http://www.ijamtes.org/gallery/101.%20nov%20ijmte%20-%20as.pdf>
- Gulati, R. (2010). Reorganize for resilience: Putting customers at the center of your business. Harvard Business Press. <https://books.google.com.au/books?hl=en&lr=&id=oDIhh7kntSkC&oi=fnd&pg=PP8&dq=Blow-Up+Your+Diversity+Approach+and+Maximize+Business+Results+With+Customer+Reflection+Diversity&ots=rH6yldx4UF&sig=wSq7Ph1FCnM9qYQ0KX9-eow33H8#v=onepage&q&f=false>
- HealthWest (2020). Standards for Workforce Mutuality: Building workforces that reflect the diversity of the community. https://healthwest.org.au/wp-content/uploads/2019/02/HW_WorkforceMutualityStandards_1stedition-1.pdf
- Hunt, V., Layton, D., & Prince, S. (2015). Diversity matters, McKinsey & Company, 1(1), 15-29. <http://www.insurance.ca.gov/diversity/41-1SDGBD/GBDEExternal/upload/McKinseyDivmatters-201501.pdf>
- Hunt, V., Prince, S., Dixon-Fyle, S., & Yee, L. (2018). Delivering through diversity, McKinsey & Company Report. <https://assetsprod.microsoft.com/mpn/it-it/delivering-through-diversity.pdf>
- Jayne, M.E.A., & Dipboye, R.L. (2004). Leveraging Diversity to Improve Business Performance: Research Finding and Recommendations for Organisations. *Human Resource Management*, 43(4), 409-424. <http://doi.org/10.1002/hrm.20033>
- Kennedy, J.T. & Jain, P. (2019) Companies Need to do more for Employees and Customers with Disabilities. *Harvard Business Review*. <https://hbr.org/2019/11/companies-need-to-do-more-for-employees-and-customers-with-disabilities>
- Kochan, T., Bezrukova, K., Ely, R., Jackson, S., Joshi, A., Jehn, K., (2003). The effects of diversity on business performance: Report of the diversity research network. *Human Resource Management*, 42, 3-21.
- Konrad, A. (2003). Defining the domain of workplace diversity scholarship. *Group & Organisation Management*, 28(1), 4-17.
- Kotu, V. & Deshpande, B. (2019). Data Science – Chapter 4 Cosine Similarity Classification. <https://doi.org/10.1016/B978-0-12-814761-0.00004-6>
- Kronholz, J. (2006). Hispanics gain in census. *Wall Street Journal*, A6.
- Ladd, J.R. (2020). Understanding and Using Common Similarity Measures for Text Analysis, *The Programming Historian*, <https://doi.org/10.46430/phen0089>
- Leonard, S., Levine, D., & Joshi, A. (2004). Do birds of a feather shop together? The effects on performance of employees' similarity with one another and with customers. *Journal of Organisational Behavior*, 25(6), 731-754.
- Lewis, V. Marsh, G. Hanley, F. Macmillan, J. Morgain, L. Silburn, K. Kalucy, E. Dwyer, J. Rostant & Mead, C. (2014). "Policy Options" Overcoming Barriers to Consumer Transitions through the Primary
- Lorenzo, R., Voigt, N., Schetelig, K., Zawadzki, A., Welpel, I., & Brosi, P. (2017). The Mix that Matters: Innovation through Diversity. <https://www.bcg.com/publications/2017/people-organisation-leadership-talent-innovation-through-diversity-mix-that-matters.aspx>
- Madera, J.M. (2013). Best Practices in Diversity Management in Customer Service Organisations: An Investigation of Top Companies Cited by Diversity Inc. *Cornell Hospitality Quarterly*, 54(2), 124-135. <https://doi.org/10.1177/1938965513475526>
- McCuiston, V.E., Wooldridge, B.R. & Pierce, C.K. (2004). Leading the diverse workforce: Profit, prospects and progress. *The Leadership & Organisation Development Journal*, 23(1), 73-92. <https://doi.org/10.1108/01437730410512787>



- Memon, Md. Abdul Basit (2019). Influence of trust on sharing of knowledge in a cross-cultural working environment [Ph.D. Thesis, Middlesex university] Retrieved from <https://eprints.mdx.ac.uk/26462/>
- Minority Business Development Agency (1999). The emerging minority marketplace. Washington, DC: US Department of Commerce.
- Morey, T.S. (2018). Diversity, Inclusion, and Storying: Connecting Across Cultures to Give Meaning to Patients' Whole Health. *Creative Nursing*, 24(1), 12-19. <http://dx.doi.org/10.1891/1078-4535.24.1.12>
- Nair, N. & Vohra, N. (2015). Diversity and Inclusion at the Workplace: A Review of Research and Perspectives. *Indian Institute of Management*, 34(3), 1-36. <http://vslir.iima.ac.in:8080/jspui/handle/11718/16616>
- Paul, A.K., McElroy, T. & Leatherberry, T. (2011). Diversity as an engine of innovation: Retail and consumer goods companies find competitive advantage in diversity. *Deloitte Insights*. <https://www2.deloitte.com/us/en/insights/deloitte-review/issue-8/diversity-as-an-engine-of-innovation.html>
- Phillips, J.M. & Malone, B. (2014). Increasing racial/ethnic diversity in nursing to reduce health disparities and achieve health equity. *National Library of Medicine*, 129(2), 45-50. <https://pubmed.ncbi.nlm.nih.gov/24385664/>
- Planigale, M. (2019). Diversity Atlas: Helping Organisations to Measure and Understand their Diversity [blog post]. <http://www.lirata.com/index.php/resources/29-industry-directions/102-diversity-atlas-interview>
- Riordan, C. M. (2000). Relational demography within groups: Past developments, contradictions, and new directions. *Research in Personnel and Human Resources Management*, 19, 131-173.
- Ristanti, P.Y., Wibawa, A.P., & Pujianto, U. (2019). Cosine Similarity for Title and Abstract of Economic Journal Classification, 2019 5th International Conference on Science in Information Technology (ICSITech), Yogyakarta, Indonesia, 123-127. doi:10.1109/ICSITech46713.2019.8987547. <https://ieeexplore.ieee.org/document/8987547>
- SLA. (2019). Mutuality, Diversity and Sharing are Key Conference Themes. *Information Outlook*, 23(3), 1-3. <https://www.proquest.com/docview/2345530959/fulltextPDF/B7C6FDBE86224EF0PQ/2?accountid=12372>
- Schmitt, B.H. (2010). *Customer experience management: A revolutionary approach to connecting with your customers*. John Wiley & Sons. <https://books.google.com.au/>
- Schueffel, P., & Istria, C. (2005). Winning through diversity. *European Business Forum*, 20, 41-44.
- Slater, F.S., Weigand, R.A. & Zwirlein, T.J. (2008). The business case for commitment to diversity. *Business Horizons*, 51(3), 201-209. <https://doi.org/10.1016/j.bushor.2008.01.003>
- Spevick, J. (2003). The case for racial concordance between patients and physicians. *AMA Journal of Ethics*, 5(6), 163-165. <https://journalofethics.ama-assn.org/sites/journalofethics.ama-assn.org/files/2018-07/jdsc2-0306.pdf>
- Standish, J., Taiano, J., & Bossi, M. (2019). All in: Inclusion & Diversity drive shopper habits. *Accenture*.
- US Census Bureau (2001), *Census 2000*. www.census.gov/dmd/www/products.html.
- Williams, S.D., Hansen, K., Smithey, M., Burnley, J., Koplitz, M., Koyama, K., & Bakos, A. (2014). Using social determinants of health to link health workforce diversity, care quality and access, and health disparities to achieve health equity in nursing. *Public Health Reports*, 129(1), 32-36. <https://pubmed.ncbi.nlm.nih.gov/24385662/>
- Williams, K.Y., & O'Reilly, C.A. (1998). Demography and diversity in organisations: A review of 40 years of research. *Research in Organisational Behavior*, 20, 77-140.
- World Health Organisation (2018). *Health Systems: Equity*. www.who.int/healthsystems/topics/equity/en/

Appendix 1: Pseudo-Code



```

Pseudo Code.py Pseudo Code.py...
Import all the necessary library functions

def square_rooted(x):
    return round(sqrt(sum([a*a for a in x])), 3)

#Input Section
df_organization = Read the excel datasheet of the organization (Choose the 4 pillars)
df_clients = Read the excel datasheet of the customer base (Choose the correspondign 4 pillars)

#Processing Section
define a function for Cosine Similarity:
    Numerator = dot product of items from each pillar of two different datasheets (org, client)
    Denominator = product of Magnitude of each pillar of two different datasheets (org, client)
    display the value of the fraction (Numerator/Denominator)

#Sorting data for Country_of_Birth

#Convert excel sheet into a dataframe
df_org_cob = Find the values: aggregate values for country of birth of employees
df_cust_cob = Find the values: aggregate values for country of birth of customers

#Convert dataframes into readable python format
cob_org = {} #create empty dictionary for organization
cob_cust = {} #create empty dictionary for customer base

#Compare and arrange the countries in the same order; Ensure to not miss any of them
for country, value in organization dataframe:
    arrange the values next to the corresponding countries
    if same countries are present in customer data
        then set the values of them accordingly from customer data sheet
    else:
        set the value of the new country to zero in customer data sheet
end for loop

for country, value in customer dataframe :
    if country is in customer and not in organization:
        create that country in organization dictionary and set it to zero.
        at the same place, set the right value of the country in customer dictionary as it is.
end for loop

#Convert dictionary into list to pass it to cosine similarity function
cob_emps_list = create an empty list
cob_clients_list = create an empty list

#Append lists by filling the right values for their corresponding key countries
for country in cob_emps.keys():
    append organization's list
    append customers'list
end for loop

cob_result = cosine_similarity(cob_emps_list, cob_clients_list) #pass the values to cosine similarity function

#Repeat the same procedure for the other pillars: Ethnicity, Worldviews and language

#Find the average of cosine similarity of all the four pillars as estimated above
average = (cob_result + vw_result + eth_result + lang_result)/4

#Output Section
print(f"COB cosine similarity: {cob_result}") #Display country of birth mutuality
print(f"Ethnicity cosine similarity: {eth_result}") #Display Ethnicity mutuality
print(f"World View cosine similarity: {vw_result}") #Display Worldview mutuality
print(f"Language cosine similarity: {lang_result}") #Display Language mutuality

print(f"Mutuality Index of the organization: {average}") #Display Final Mutuality Index
    
```

Appendix 2

Results from the python program

Example 1

Country of Birth -
 Organisation:

{'Australia': 89, 'India': 11, 'United Kingdom': 5, 'China': 3, 'United States': 2, 'Aland Islands': 2, 'South Africa': 2, 'Austria': 2, 'Canada': 2, 'Japan': 2, 'Algeria': 1, 'Cambodia': 1, 'Madagascar': 1, 'Maldives': 1, 'Nepal': 1, 'New Zealand': 1, 'Pakistan': 1, 'Philippines': 1, 'Singapore': 1, 'Ukraine': 1, 'Afghanistan': 1, 'Iran': 0, 'Akrotiri and Dhekelia': 0,

'Albania': 0, 'France': 0, 'Italy': 0, 'Brazil': 0, 'Germany': 0, 'Greece': 0, 'Hong Kong': 0, 'Indonesia': 0, 'Sri Lanka': 0, 'Armenia': 0, 'Belgium': 0, 'Guadeloupe': 0, 'Netherlands': 0, 'Mauritius': 0, 'Denmark': 0, 'Macau': 0, 'Israel': 0, 'Viet Nam': 0}

Customer Base:

{'Australia': 36, 'India': 12, 'United Kingdom': 6, 'China': 4, 'United States': 6, 'Aland Islands': 5, 'South Africa': 0, 'Austria': 1, 'Canada': 0, 'Japan': 1, 'Algeria': 2, 'Cambodia': 0, 'Madagascar': 0, 'Maldives': 0, 'Nepal': 0, 'New Zealand': 2, 'Pakistan': 2, 'Philippines': 1, 'Singapore': 1, 'Ukraine': 0, 'Afghanistan': 7, 'Iran': 8, 'Akrotiri and Dhekelia': 6,



'Albania': 5, 'France': 3, 'Italy': 3, 'Brazil': 2, 'Germany': 2, 'Greece': 2, 'Hong Kong': 2, 'Indonesia': 1, 'Sri Lanka': 1, 'Armenia': 1, 'Belgium': 1, 'Guadeloupe': 1, 'Netherlands': 1, 'Mauritius': 1, 'Denmark': 1, 'Macau': 1, 'Israel': 1, 'Viet Nam': 1}

Ethnicity -

Organisation:

{'American': 6, 'Aimaq': 4, 'Peruvian': 1, 'Ishkashimi': 1, 'Gujar/Gujjar': 1, 'German': 1, 'Australian': 1, 'Arora': 1, 'Persian': 0, 'Anglo': 0, 'Greek': 0, 'Chinese': 0, 'Abaga': 0, 'Ababda': 0, 'Abai': 0, 'African-American': 0, 'Abnaki': 0, 'Aborigine': 0, 'Adabe': 0, 'Sinhalese/Sinhalese': 0, 'Azerbaijani/Azeri': 0, 'British-Indians': 0, 'Egyptian': 0, 'Filipino-Chinese': 0, 'Iranian/Perisan/Farsi': 0, 'Jewish': 0, 'A-Hmao': 0}

Customer Base:

{'American': 1, 'Aimaq': 0, 'Peruvian': 0, 'Ishkashimi': 0, 'Gujar/Gujjar': 0, 'German': 0, 'Australian': 2, 'Arora': 0, 'Persian': 16, 'Anglo': 6, 'Greek': 5, 'Chinese': 4, 'Abaga': 3, 'Ababda': 2, 'Abai': 2, 'African-American': 1, 'Abnaki': 1, 'Aborigine': 1, 'Adabe': 1, 'Sinhalese/Sinhalese': 1, 'Azerbaijani/Azeri': 1, 'British-Indians': 1, 'Egyptian': 1, 'Filipino-Chinese': 1, 'Iranian/Perisan/Farsi': 1, 'Jewish': 1, 'A-Hmao': 1}

Worldview -

Organisation:

{'Christianity': 57, 'Atheism': 14, 'Hinduism': 13, 'No Religion': 8, 'Islam': 4, 'Buddhism': 4, 'Adonism': 3, 'Ahmadiyya': 3, 'Munism': 2, 'Freethought': 2, 'Confucianism': 2, 'Akamba Religion': 2, 'Apocalypticism': 1, 'Agnosticism': 1, 'Rastafarianism': 1, 'Bushongo Religion': 1, 'Japanese Traditional Religions': 1, 'Javanese': 1, 'Church of World Messianity': 1, 'Italian': 0, 'Spanish': 0, 'Nature Religions': 0, 'African Traditional Religions': 0, 'Ancient Greek (to 1453)': 0, 'Armenian Traditional Beliefs': 0, 'Bathouism': 0, 'Zoroastrianism (Mazdayasna)': 0, 'Choctaw Religion': 0, 'French': 0, 'Vietnamese Traditional Religion': 0, 'Mandarin Chinese': 0, 'Muisca Religion': 0, 'Raelism': 0, 'Turkish': 0, 'Abenaki Religion': 0}

Customer Base:

{'Christianity': 49, 'Atheism': 9, 'Hinduism': 10, 'No Religion': 9, 'Islam': 7, 'Buddhism': 6, 'Adonism': 0, 'Ahmadiyya': 1, 'Munism': 0, 'Freethought': 0, 'Confucianism': 0, 'Akamba Religion': 0, 'Apocalypticism': 0, 'Agnosticism': 1, 'Rastafarianism': 0, 'Bushongo Religion': 0, 'Japanese Traditional Religions': 1, 'Javanese': 0,

'Church of World Messianity': 0, 'Italian': 4, 'Spanish': 2, 'Nature Religions': 2, 'African Traditional Religions': 1, 'Ancient Greek (to 1453)': 1, 'Armenian Traditional Beliefs': 1, 'Bathouism': 1, 'Zoroastrianism (Mazdayasna)': 1, 'Choctaw Religion': 1, 'French': 1, 'Vietnamese Traditional Religion': 1, 'Mandarin Chinese': 1, 'Muisca Religion': 1, 'Raelism': 1, 'Turkish': 1, 'Abenaki Religion': 1}

Language -

Organisation:

{'English (Australia)': 87, 'English (International)': 13, 'Punjabi (India)': 3, 'Laha (Viet Nam)': 3, 'Hindi': 3, 'English (New Zealand)': 3, 'Ukrainian (Ukraine)': 1, 'Ainu (China)': 1, 'Ainu (Japan)': 1, 'Arabic (Egypt)': 1, 'Argentine Sign Language': 1, 'Brazilian Sign Language': 1, 'English (Belize)': 1, 'English (Canada)': 1, 'English (United Kingdom)': 1, 'Singapore Sign Language': 1, 'English (United States)': 1, 'Fiji Hindi': 1, 'French (France)': 1, 'Greek': 1, 'Mandarin Chinese': 1, 'Nepali': 1, 'Northern Sotho (South Africa)': 1, 'Ache (China)': 1, 'Aari': 0, 'Persian': 0, 'Aasáx': 0, 'A Pucikwar': 0, 'Iranian Persian': 0, 'Abaga': 0, 'Japanese (Japan)': 0, 'Chinese': 0, 'Portuguese': 0, 'Mayangna': 0, 'Abadi': 0, 'Aer': 0, 'Afrikaans': 0, 'Arabic': 0, 'Armenian': 0, 'Awa (China)': 0, 'Marathi': 0, 'Dari': 0, 'Tagalog (Philippines)': 0, 'French (Belgium)': 0, 'Italian (Italy)': 0, 'Vietnamese': 0}

Customer Base:

{'English (Australia)': 40, 'English (International)': 28, 'Punjabi (India)': 0, 'Laha (Viet Nam)': 0, 'Hindi': 1, 'English (New Zealand)': 1, 'Ukrainian (Ukraine)': 0, 'Ainu (China)': 0, 'Ainu (Japan)': 0, 'Arabic (Egypt)': 0, 'Argentine Sign Language': 0, 'Brazilian Sign Language': 1, 'English (Belize)': 1, 'English (Canada)': 1, 'English (United Kingdom)': 1, 'Singapore Sign Language': 0, 'English (United States)': 2, 'Fiji Hindi': 0, 'French (France)': 0, 'Greek': 1, 'Mandarin Chinese': 3, 'Nepali': 0, 'Northern Sotho (South Africa)': 0, 'Ache (China)': 0, 'Aari': 11, 'Persian': 7, 'Aasáx': 5, 'A Pucikwar': 4, 'Iranian Persian': 3, 'Abaga': 3, 'Japanese (Japan)': 2, 'Chinese': 1, 'Portuguese': 1, 'Mayangna': 1, 'Abadi': 1, 'Aer': 1, 'Afrikaans': 1, 'Arabic': 1, 'Armenian': 1, 'Awa (China)': 1, 'Marathi': 1, 'Dari': 1, 'Tagalog (Philippines)': 1, 'French (Belgium)': 1, 'Italian (Italy)': 1, 'Vietnamese': 1}

COB cosine similarity: 0.898

Ethnicity cosine similarity: 0.055

World View cosine similarity: 0.983

Language cosine similarity: 0.849



Mutuality Index of the organisation: 0.696

Example 2

Country of Birth –

Organisation:

{'Australia': 125, 'India': 23, 'United Kingdom': 11, 'Afghanistan': 8, 'United States': 8, 'Iran': 8, 'Aland Islands': 7, 'China': 7, 'Akrotiri and Dhekelia': 6, 'Albania': 5, 'France': 3, 'Italy': 3, 'Japan': 3, 'Austria': 3, 'Algeria': 3, 'New Zealand': 3, 'Pakistan': 3, 'Brazil': 2, 'Philippines': 2, 'Singapore': 2, 'Hong Kong': 2, 'Greece': 2, 'Germany': 2, 'South Africa': 2, 'Canada': 2, 'Armenia': 1, 'Belgium': 1, 'Cambodia': 1, 'Viet Nam': 1, 'Denmark': 1, 'Guadeloupe': 1, 'Israel': 1, 'Macau': 1, 'Madagascar': 1, 'Maldives': 1, 'Mauritius': 1, 'Nepal': 1, 'Netherlands': 1, 'Sri Lanka': 1, 'Ukraine': 1, 'Indonesia': 1, 'Mexico': 0, 'Salvador': 0, 'Vietnam': 0, 'Cuba': 0, 'Republiquesdominicaine': 0, 'Coree du Sud': 0, 'Guatemala': 0}

Client Community:

{'Australia': 0, 'India': 2600000, 'United Kingdom': 0, 'Afghanistan': 0, 'United States': 0, 'Iran': 0, 'Aland Islands': 0, 'China': 2800000, 'Akrotiri and Dhekelia': 0, 'Albania': 0, 'France': 0, 'Italy': 0, 'Japan': 0, 'Austria': 0, 'Algeria': 0, 'New Zealand': 0, 'Pakistan': 0, 'Brazil': 0, 'Philippines': 2000000, 'Singapore': 0, 'Hong Kong': 0, 'Greece': 0, 'Germany': 0, 'South Africa': 0, 'Canada': 800000, 'Armenia': 0, 'Belgium': 0, 'Cambodia': 0, 'Viet Nam': 0, 'Denmark': 0, 'Guadeloupe': 0, 'Israel': 0, 'Macau': 0, 'Madagascar': 0, 'Maldives': 0, 'Mauritius': 0, 'Nepal': 0, 'Netherlands': 0, 'Sri Lanka': 0, 'Ukraine': 0, 'Indonesia': 0, 'Mexico': 11200000, 'Salvador': 1400000, 'Vietnam': 1300000, 'Cuba': 1300000, 'Republiquesdominicaine': 1100000, 'Coree du Sud': 1000000, 'Guatemala': 900000}

Ethnicity -

Organisation:

{'Persian': 16, 'American': 7, 'Anglo': 6, 'Greek': 5, 'Aimaq': 4, 'Chinese': 4, 'Abaga': 3, 'Australian': 3, 'Ababda': 2, 'Abai': 2, 'Sinhalese/Sinhalese': 1, 'Abnaki': 1, 'Aborigine': 1, 'Adabe': 1, 'African-American': 1, 'Azerbaijani/Azeri': 1, 'Arora': 1, 'British-Indians': 1, 'Egyptian': 1, 'Filipino-Chinese': 1, 'German': 1, 'Gujar/Gujjar': 1, 'Iranian/Perisan/Farsi': 1, 'Ishkashimi': 1, 'Jewish': 1, 'Peruvian': 1, 'A-Hmao': 1, 'American ': 0, 'African ': 0, 'Asian ': 0, 'Oceanic Americans (native Hawaiians and other Pacific Islanders)': 0, 'Prefer not to answer': 0, 'multiracial': 0}

Client Community:

{'Persian': 0, 'American': 0, 'Anglo': 0, 'Greek': 0, 'Aimaq': 0, 'Chinese': 0, 'Abaga': 0, 'Australian': 0, 'Ababda': 0, 'Abai': 0, 'Sinhalese/Sinhalese': 0, 'Abnaki': 2944800, 'Aborigine': 0, 'Adabe': 0, 'African-American': 0, 'Azerbaijani/Azeri': 0, 'Arora': 0, 'British-Indians': 0, 'Egyptian': 0, 'Filipino-Chinese': 0, 'German': 0, 'Gujar/Gujjar': 0, 'Iranian/Perisan/Farsi': 0, 'Ishkashimi': 0, 'Jewish': 0, 'Peruvian': 0, 'A-Hmao': 0, 'American ': 240000000, 'African ': 41227200, 'Asian ': 15705600, 'Oceanic Americans (native Hawaiians and other Pacific Islanders)': 654400, 'Prefer not to answer': 20286400, 'multiracial': 9488800}

Worldview -

Organisation:

Christianity': 106, 'Atheism': 23, 'Hinduism': 23, 'No Religion': 17, 'Islam': 11, 'Buddhism': 10, 'Ahmadiyya': 4, 'Italian': 4, 'Adonism': 3, 'Freethought': 2, 'Japanese Traditional Religions': 2, 'Confucianism': 2, 'Akamba Religion': 2, 'Munism': 2, 'Nature Religions': 2, 'Agnosticism': 2, 'Spanish': 2, 'Ancient Greek (to 1453)': 1, 'Apocalypticism': 1, 'Armenian Traditional Beliefs': 1, 'African Traditional Religions': 1, 'Bathouism': 1, 'Zoroastrianism (Mazdayasna)': 1, 'Bushongo Religion': 1, 'Choctaw Religion': 1, 'Church of World Messianity': 1, 'Vietnamese Traditional Religion': 1, 'French': 1, 'Javanese': 1, 'Mandarin Chinese': 1, 'Muisca Religion': 1, 'Raelism': 1, 'Rastafarianism': 1, 'Turkish': 1, 'Abenaki Religion': 1, 'No Answer': 0}

Client Community:

{'Christianity': 231003200, 'Atheism': 0, 'Hinduism': 2290400, 'No Religion': 0, 'Islam': 2944800, 'Buddhism': 2290400, 'Ahmadiyya': 0, 'Italian': 0, 'Adonism': 0, 'Freethought': 1308800, 'Japanese Traditional Religions': 0, 'Confucianism': 0, 'Akamba Religion': 0, 'Munism': 0, 'Nature Religions': 0, 'Agnosticism': 0, 'Spanish': 0, 'Ancient Greek (to 1453)': 0, 'Apocalypticism': 0, 'Armenian Traditional Beliefs': 0, 'African Traditional Religions': 0, 'Bathouism': 0, 'Zoroastrianism (Mazdayasna)': 0, 'Bushongo Religion': 0, 'Choctaw Religion': 0, 'Church of World Messianity': 0, 'Vietnamese Traditional Religion': 0, 'French': 0, 'Javanese': 0, 'Mandarin Chinese': 0, 'Muisca Religion': 0, 'Raelism': 0, 'Rastafarianism': 0, 'Turkish': 0, 'Abenaki Religion': 0, 'Judaism': 6216800, 'No Answer': 81800000}

Language -

Organisation:

'English (Australia)': 127, 'English (International)'



41, 'Aari': 11, 'Persian': 7, 'Aasáx': 5, 'English (New Zealand)': 4, 'Mandarin Chinese': 4, 'Hindi': 4, 'A Pucikwar': 4, 'Punjabi (India)': 3, 'Laha (Viet Nam)': 3, 'Iranian Persian': 3, 'Abaga': 3, 'English (United States)': 3, 'Brazilian Sign Language': 2, 'Japanese (Japan)': 2, 'Greek': 2, 'English (Belize)': 2, 'English (United Kingdom)': 2, 'English (Canada)': 2, 'Ainu (China)': 1, 'Arabic (Egypt)': 1, 'Arabic': 1, 'Ainu (Japan)': 1, 'Aer': 1, 'Afrikaans': 1, 'Armenian': 1, 'Ache (China)': 1, 'Abadi': 1, 'Singapore Sign Language': 1, 'Tagalog (Philippines)': 1, 'Argentine Sign Language': 1, 'Mayangna': 1, 'Awa (China)': 1, 'Chinese': 1, 'Dari': 1, 'Marathi': 1, 'Portuguese': 1, 'Ukrainian (Ukraine)': 1, 'Fiji Hindi': 1, 'French (Belgium)': 1, 'French (France)': 1, 'Northern Sotho (South Africa)': 1, 'Italian (Italy)': 1, 'Nepali': 1, 'Vietnamese': 1, 'English (United States) ': 0, 'Spanish ': 0, 'Mandarin Chinese ': 0, 'French ': 0, 'Tagalog (Philippines) ': 0, 'Korean ': 0, 'German (Germany) ': 0, 'Arabic ': 0, 'Russian': 0}

Client Community:

{'English (Australia)': 0, 'English (International)': 0, 'Aari': 0, 'Persian': 0, 'Aasáx': 0, 'English (New Zealand)': 0, 'Mandarin Chinese': 0, 'Hindi': 0, 'A Pucikwar': 0, 'Punjabi (India)': 0, 'Laha (Viet Nam)': 1400000, 'Iranian Persian': 0, 'Abaga': 0, 'English (United States)': 0, 'Brazilian Sign Language': 0, 'Japanese (Japan)': 0, 'Greek': 0, 'English (Belize)': 0, 'English (United Kingdom)': 0, 'English (Canada)': 0, 'Ainu (China)': 0, 'Arabic (Egypt)': 0, 'Arabic': 0, 'Ainu (Japan)': 0, 'Aer': 0, 'Afrikaans': 0, 'Armenian': 0, 'Ache (China)': 0, 'Abadi': 0, 'Singapore Sign Language': 0, 'Tagalog (Philippines)': 0, 'Argentine Sign Language': 0, 'Mayangna': 0, 'Awa (China)': 0, 'Chinese': 0, 'Dari': 0, 'Marathi': 0, 'Portuguese': 0, 'Ukrainian (Ukraine)': 0, 'Fiji Hindi': 0, 'French (Belgium)': 0, 'French (France)': 0, 'Northern Sotho (South Africa)': 0, 'Italian (Italy)': 0, 'Nepali': 0, 'Vietnamese': 0, 'English (United States) ': 231000000, 'Spanish ': 37000000, 'Mandarin Chinese ': 3000000, 'French ': 2000000, 'Tagalog (Philippines) ': 1600000, 'Korean ': 1000000, 'German (Germany) ': 1000000, 'Arabic ': 900000, 'Russian': 820000}

COB cosine similarity: 0.064

Ethnicity cosine similarity: 0.001

World View cosine similarity: 0.884

Language cosine similarity: 0.023

Mutuality Index of the organisation: 0.243

