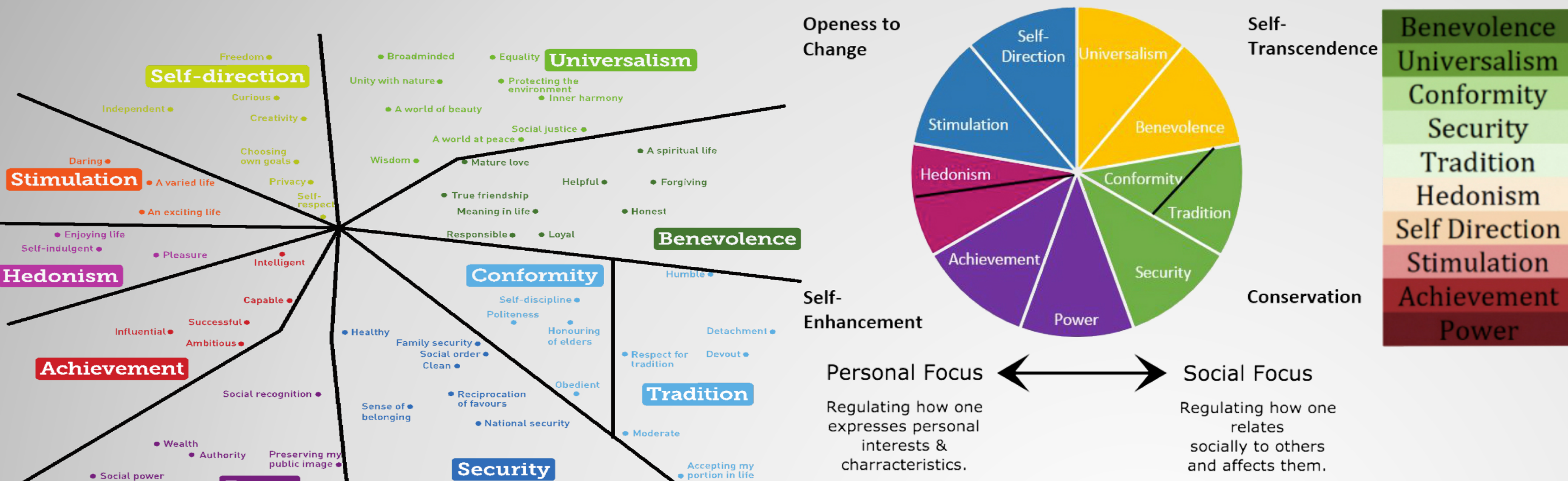


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1 Schwartz Values Definitions and Super-Classes



- ❖ **Achievement (AC):** The value here comes from setting goals and then achieving them.
- ❖ **Benevolence (BE):** Those who tend towards being benevolent are very philanthropic, they seek to help others and provide general welfare.
- ❖ **Conformity (CO):** This category of people obey clear rules and structures.
- ❖ **Hedonism (HE):** Hedonists are those who simply enjoy themselves.
- ❖ **Power (PO):** The ability to control others is important to people who possess this value and power will be actively sought by dominating others and control over resources.
- ❖ **Security (SE):** Those who seek security value, health and safety to a greater extent than other people (perhaps because of childhood woes).
- ❖ **Self-direction (SD):** Individuals who are self-directed, enjoy being independent and are outside the control of others.
- ❖ **Stimulation (ST):** Is closely related to hedonism, nevertheless the goals are slightly different. In this case, pleasure is acquired specifically from excitement and thrill.
- ❖ **Tradition (TR):** A traditionalist respects practices of the past, doing things blindly because they are customary.
- ❖ **Universalism (UN):** Individuals who seek social justice and tolerance for all.

2 Twitter Values Corpus

TABLE 1: An example of the instructions and format of the Portrait Values Questionnaire (PVQ). For each statement, the respondents should answer the question "How much like you is this person?" by checking one of the six boxes.

Here we briefly describe some people. Please read each description and think about how much each person is or is not like you. Tick the box to the right that shows how much the person in the description is like you.

	Very much like me	Like me	Some-what like me	A little like me	Not like me	Not like me at all
1. Thinking up new ideas and being creative is important to her. She likes to do things in her original way. SD	6	5	4	3	2	1
2. It is important to her to be rich. She wants to have a lot of money and expensive things. PO	6	5	4	3	2	1
3. She thinks it is important that every person in the world be treated equally. She believes everyone should have equal opportunities in life. UN	6	5	4	3	2	1
4. It is important to her to show her abilities. She wants people to admire what she does. AC	6	5	4	3	2	1
5. It is important to her to live in secure surroundings. She avoids anything that might endanger her safety. SE	6	5	4	3	2	1

Corpus Statistics

- ❖ 367 users data
- ❖ highest no. of tweets: 15K
- ❖ lowest no. of tweets: 100
- ❖ Avg. no. tweets 1,608

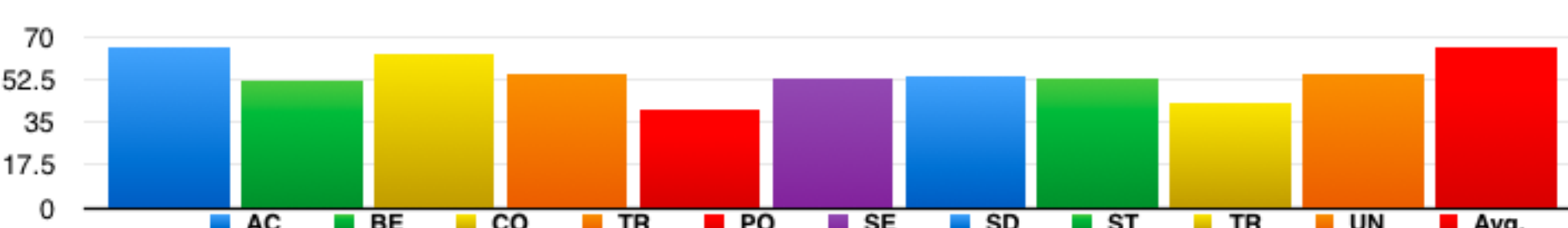


Figure 1: Values Class Distribution in the Twitter Corpus.

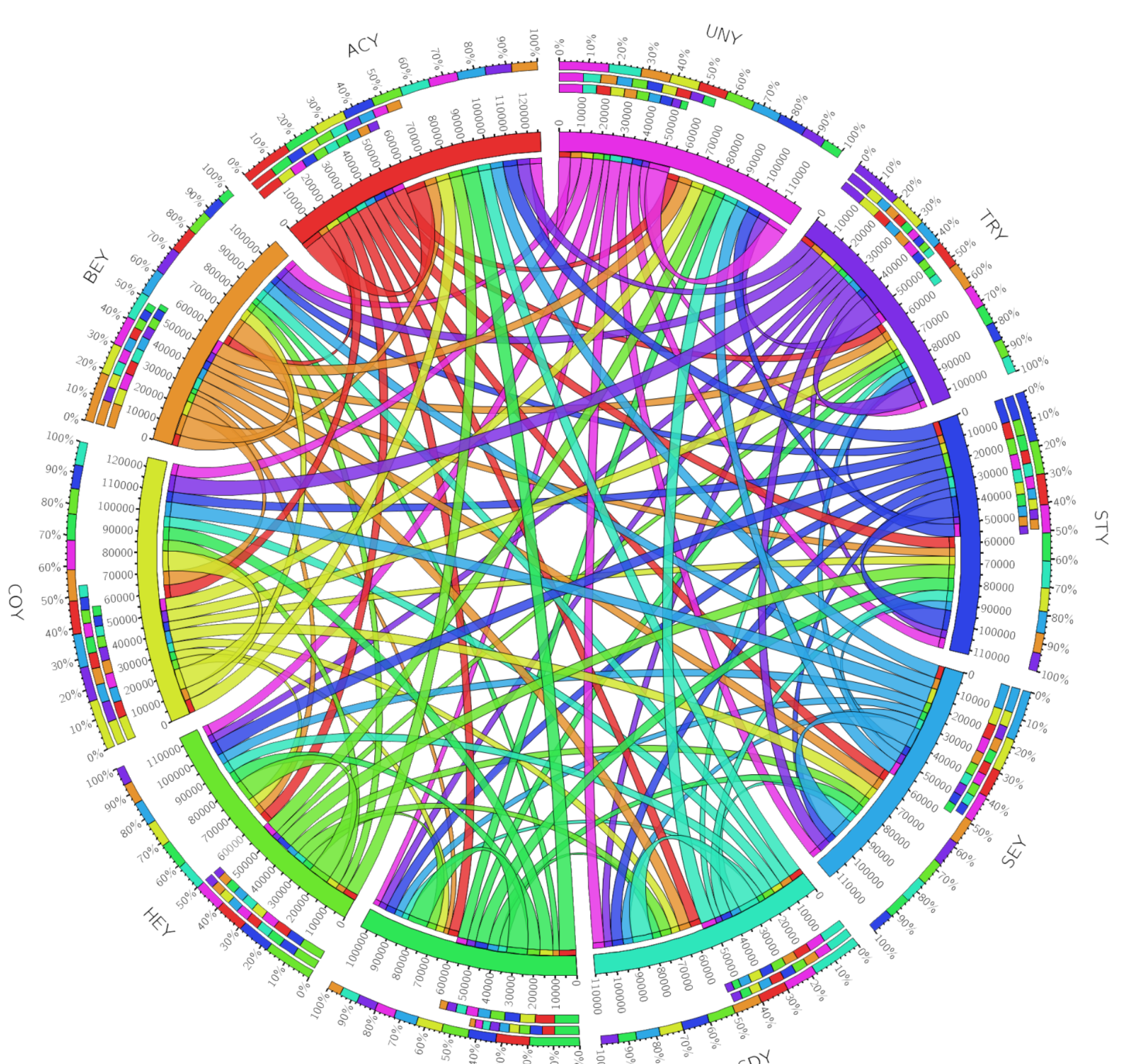


Figure 2: Schwartz Values fuzziness for Twitter Values corpus using Circos. The width of each outgoing band from any value represents the degree of membership of that Value with other Values.

7 Indian Values : Cosmopolitan Mumbai, Orthodox Delhi, Techcity Bangalore

	AC	BE	CO	HE	PO	SE	SD	ST	TR	UN	SC1	SC2	SC4	SC1
North India	37.83	15.0	100.0	15.0	100.0	45.53	100.0	100.0	100.0	100.0	100.0	100.0	100.0	33.0
South India	15.0	91.36	100.0	22.58	15.0	93.75	100.0	100.0	15.0	100.0	33.0	100.0	10.0	89.96
East India	18.91	98.7	100.0	55.48	45.92	100.0	100.0	100.0	70.15	100.0	63.5	100.0	66.0	97.19
West/Central India	100.0	100.0	100.0	100.0	57.97	15.0	15.0	100.0	29.09	100.0	87.22	33.0	12.55	100.0

- ❖ North India [ST: 100, SE: 100, CON: 33, OC: 100]
➢ [Srinagar, Amritsar, Chandigarh, Delhi, Lucknow, Varanasi, Kanpur, Indore]
- ❖ South India [ST: 33, SE: 100, CON: 89.96, OC: 100]
➢ [Bangalore, Hyderabad, Chennai, Vizag]
- ❖ East India [ST: 63.5, SE: 100, CON: 97.19, OC: 66]
➢ [Ranchi, Kolkata, Guwahati]
- ❖ West India [ST: 87.22, SE: 33, CON: 12.55, OC: 100]
➢ [Jaipur, Ahmedabad, Mumbai, Pune, Goa]

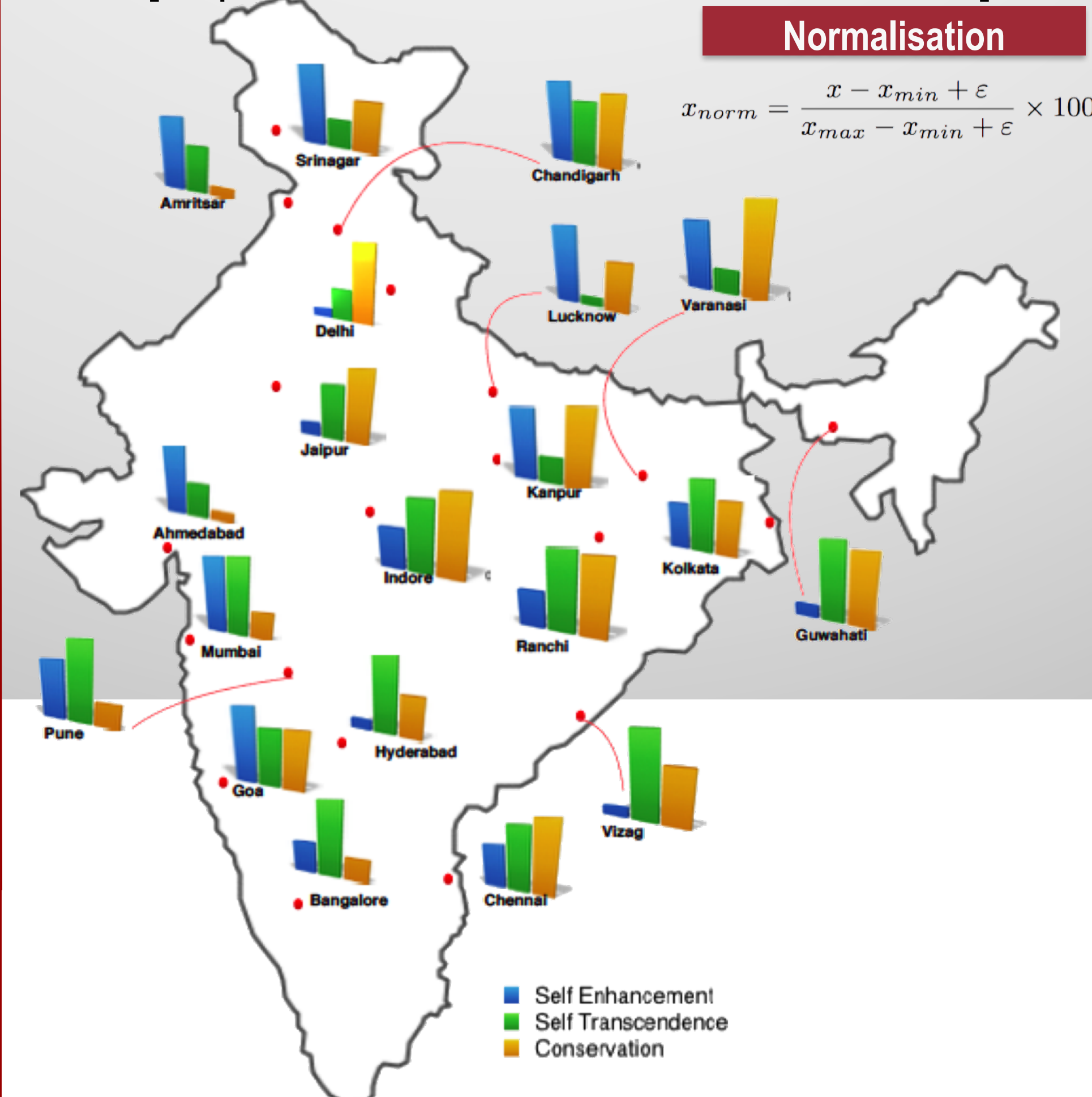


Figure 3: "Unity in Diversity": City-Wise Indian Values: An analysis on Twitter data of 20 most populous cities of India.

3 Features & Classifiers

- ❖ Linguistic Inquiry Word Count analysis
- ❖ N-grams (2, 3, 4, 5)
- ❖ Topic modeling (10, 20, 50, 75, and 100)
- ❖ Psycholinguistic lexica
➢ Harvard General Inquirer (pleasure, pain, virtue, vice...)
- MRC Psycholinguistic lexicon (familiarity, concreteness, imaginability)
- ❖ Speech-Acts (wh-question, yes-No question, opinion, thanking, appreciation)
- ❖ Non-linguistic features (centrality, betweenness)

	LIWC	Achieve	Benevol	Conform	Hedonism	Power	Security	Self-Direction	Stimulation	Tradition
PREPS	0.014	0.066	-0.008	-0.007	-0.033	-0.035	-0.091	-0.014	-0.029	-
SPACE	-0.002	0.019	0.001	-0.001	-0.077	0.013	0.040	0.010	-0.003	-
TIME	0.028	0.015	0.017	-0.008	-0.073	0.000	0.073	-0.015	0.033	-
OCCUP	-0.024	0.061	0.009	-0.084	-0.112	0.018	0.078	-0.017	0.062	-
ACHIEVE	0.030	-0.014	-0.016	-0.066	-0.039	0.008	-0.010	0.008	0.037	-
SENSES	-0.016	0.090	-0.001	-0.099	-0.009	-0.009	0.021	-0.056	0.008	-
CAUSE	-0.020	0.066	-0.015	-0.049	-0.089	-0.038	0.063	-0.033	0.009	-
PAST	-0.021	0.075	0.022	-0.054	-0.087	-0.004	0.036	-0.033	0.010	-
PHYSICAL	-0.068	0.100	-0.019	-0.024	-0.073	-0.049	-0.012	0.017	0.029	-
EATING	-0.012	0.058	-0.013	-0.039	-0.049	0.005	0.059	-0.016	0.002	-
DOWN	-0.008	0.040	-0.019	0.000	-0.040	-0.020	0.041	0.077	-0.019	-
COACH	-0.011	0.093	-0.017	-0.029	-0.128	-0.031	0.135	-0.013	-0.011	-
COACH	-0.015	0.069	-0.046	-0.058	-0.094	-0.046	0.090	-0.003	-0.052	-
DISCREP	-0.052	0.030	0.012	-0.013	0.000	0.014	0.015	0.015	-0.038	-
NUMBER	0.021	0.012	0.041	-0.022	-0.049	0.038	0.072	-0.004	0.034	-
CAUSE	0.004	-0.004	-0.046	-0.037	-0.040	-0.065	0.074	0.032	-0.036	-
NEGATE	-0.020	0.092	-0.026	-0.028	-0.077	-0.013	0.146	-0.029	-0.055	-
MONEY	-0.037	-0.016	-0.047	0.022	-0.021	0.055	0.047	-0.007	-0.034	-
AFFECT	-0.026	0.156	-0.004	-0.079	-0.122	-0.018	0.011	-0.037	0.003	-
NEGEMO	-0.037	0.034	-0.049	-0.055	-0.077	0.010	0.107	0.019	-0.026	-
SAD	-0.071	0.006	-0.019	-0.020	-0.073	-0.074	0.085	0.027	-0.016	-
INHIB	-0.001	-0.008	-0.068	0.021	-0.059	-0.021	0.059	0.025	-0.093	-
ANGER	-0.001	0.031	-0.006	-0.074	-0.075	0.035	0.093	-0.026	0.041	-
POSSEM	-0.017	0.120	0.013	-0.071	-0.132	-0.025	-0.030	-0.051	0.014	-
OPTIM	0.017	0.086	0.044	-0.096	-0.070	0.004	-0.024	-0.096	0.034	-
INSIGHT	-0.012	0.075	-0.093	-0.078	-0.123	-0.060	0.145	-0.015	-0.084	-
PRESENT	-0.014	0.093	-0.017	-0.021	-0.102	-0.016	0.080	-0.026	-0.008	-
ASSENT	-0.026	0.044	-0.070	0.006	-0.035	-0.090	0.057	0.072	-0.012	-
BODY	-0.104	0.060	-0.021	0.015	-0.033	0.004	0.055	0.035	-0.039	-
POSTREL	-0.036	0.076	-0.033	0.009	-0.065	-0.072	0.041	-0.014	0.001	-
ANK	0.020	-0.055	-0.092	0.003	-0.008	0.007	0.006	0.074	-0.081	-
SOCIAL	-0.017	0.118	0.001	-0.064	-0.097	0.031	0.024	-0.067	0.021	-
CONFIRM	0.019	0.115	0.003	-0.096	-0.082	0.021	0.005	-0.016	0.002	-
CERTAIN	-0.030	0.126	0.089	-0.130	-0.096	0.048	0.013	-0.091	0.072	-
SWEAR	-0.060	0.031	-0.065	0.049	-0.039	-0.035	0.072	0.038	-0.050	-
POS	0.035	-0.080	-0.015	-0.020	0.014	0.058	-0.009	0.007	-0.016	-
METAPH	0.015	0.100	0.186	-0.179	-0.088	0.042	-0.139	-0.131	0.326	-
RELIG	0.025	0.097	0.139	-0.186	-0.065	0.046	-0.148	-0.135	0.326	-
TENTAT	-0.040	0.124	-0.027	-0.001	-0.092	-0.081	0.102	0.050	-0.037	-
SLEEP	-0.002	-0.012	-0.051	0.021	-0.028	-0.069	0.055	0.027	0.028	-
DEATH	-0.060	0.045	0.021	-0.015	-0.039	-0.020	0.030	-0.006	0.042	-
SEXUAL	-0.039	0.074	-0.014	-0.004	-0.053	-0.064	-0.092	0.030	0.054	-
SCHOOL	0.058	0.028	0.078	-0.060	-0.078	-0.053	-0.011	-0.029	0.041	-
LEISURE	0.039	0.042	0.066	-0.012	-0.014	0.072	-0.036	-0.096	0.089	-
HOME	-0.005	0.027	0.078	0.006	-0.004	0.107	-0.083	-0.086	0.090	-
SHIRLES	0.004	-0.050	-0.072	0.007	-0.025	-0.007	0.034	-0.078	-0.016	-
FEEL	-0.054	0.049	-0.066	-0.026	-0.073	-0.013	0.018	-0.036	-0.030	-
SPORTS	0.065	-0.021	-0.030	0.073	-0.015	-0.056	0.054	0.005	-0.041	-

Figure 3: Best LIWC feature selection (Pearson) for each of Schwartz' ten Values.

Feature Ablation	AC	BE	CO	HE	PO	SE	SD	ST	TR	UN
Before Ablation	65.84	56.06	64.02	58.02	58.80	53.06	60.89	56.58	64.28	65.58
After Ablation	65.84	58.54	64.80	58.93	59.58	55.80	61.53	56.84	65.06	66.10
Number of features	52	37	65	38	54	47	65	53	39	48

Table 2: F-Scores for best feature selection on LIWC feature set for each of Schwartz' ten Values.

4 Performance on Schwartz Values Classification

As a Multi-Class Classification Problem

Value Classifier	Achievement	Benevolence	Conformity	Hedonism	Power
LIWC	80.95	80.93	80.10	78.75	77.38
+ Topic	76.66	80.65	80.61	78.20	77.93
+ Lexica	71.10	75.70	69.70	71.90	69.00
+ Non-linguistic	74.11	80.38	80.93	68.40	78.47
+ Speech-Act	81.10	76.40	68.00	81.00	73.00

Value Classifier	Security	Self-Direction	Stimulation	Tradition	Universalism
LIWC	76.29	75.75	74.11	83.38	83.38
+ Topic	76.57	74.93	75.48	76.84	83.38
+ Lexica	76.60	74.30	69.50	76.80	83.38
+ Non-linguistic	71.18	74.46	75.20	76.57	83.38
+ Speech-Act	78.00	80.00	69.00	78.00	75.00

Table 3: Performance of the Values model as a Multi-Valued Regression Problem

Values	AC	BE	CO	HE	PO	SE	SD	ST	TR	UN	Avg.
PC	0.32	0.21	0.21	0.25	0.28	0.32	0.32	0.27	0.35	0.34	0.29

Table 4: Performance (Pearson) of the Values Regression model

Values	AC	BE	CO	HE	PO	SE	SD	ST	TR	UN	Avg.
PC	0.32	0.21	0.21	0.25	0.28	0.32	0.32	0.27	0.35	0.34	0.29

5 Semantic Interpretation of Communities

SNAP Dataset
<https://snap.stanford.edu/>

Original Dataset:

- ❖ Nodes: 81,306, edges: 1,768,149

We Extracted:

- ❖ 1,562 ground-truth communities
- only communities having <5 member, and
- Users with tweets less than 100)

Cross-Entropy Relationships

Class	AC	BE	CO	HE	PO	SE	SD	ST	TR	UN
AC	-	0.01	0.13	0.09	0.76	0.78	0.08	0.78	0.79	0.17
BE	0.01	-	0.13	0.18	0.79	0.18	0.18	0.18	0.83	0.27
CO	0.00	0.01	-	0.09	0.76	0.09	0.89	0.89	0.76	0.14
HE	0.01	0.00	0.15	-	0.73	0.00	0.01	0.00	0.78	0.09
PO	0.01	0.00	0.13	0.06	-	0.07	0.06	0.07	0.79	0.15
SE	0.00	0.00	0.15	0.00	0.73	-	0.02	0.02	0.77	0.09
SD	0.00	0.00	0.16	0.00	0.72	0.01	-	0.00	0.77	0.10
ST	0.01	0.00	0.14	0.01	0.73	0.01	0.00	-	0.79	0.09
TR	0.00	0.00	0.10	0.05	0.75	0.05	0.05	0.06	-	0.13
UN	0.01	0.00	0.12	0.00	0.73	0.00	0.01	0.01	0.75	-

Table 5: Values vs. Values

- ❖ Traditional people can hardly manage themselves in any other oriented group.
- ❖ Self-direction (SD) people find it very hard to fit into a conformity (CO) group as SD(Self-Direction) oriented people want to lead life on their own rules.

Class	O	C	E	A	N
O	–	0.76	0.74	0.31	0.32
C	0.00	–	0.56	0.21	0.20
E	0.01	0.59	–	0.21	0.19
A	0.00	0.57	0.55	–	0.18
N	0.20	0.59	0.54	0.19	–