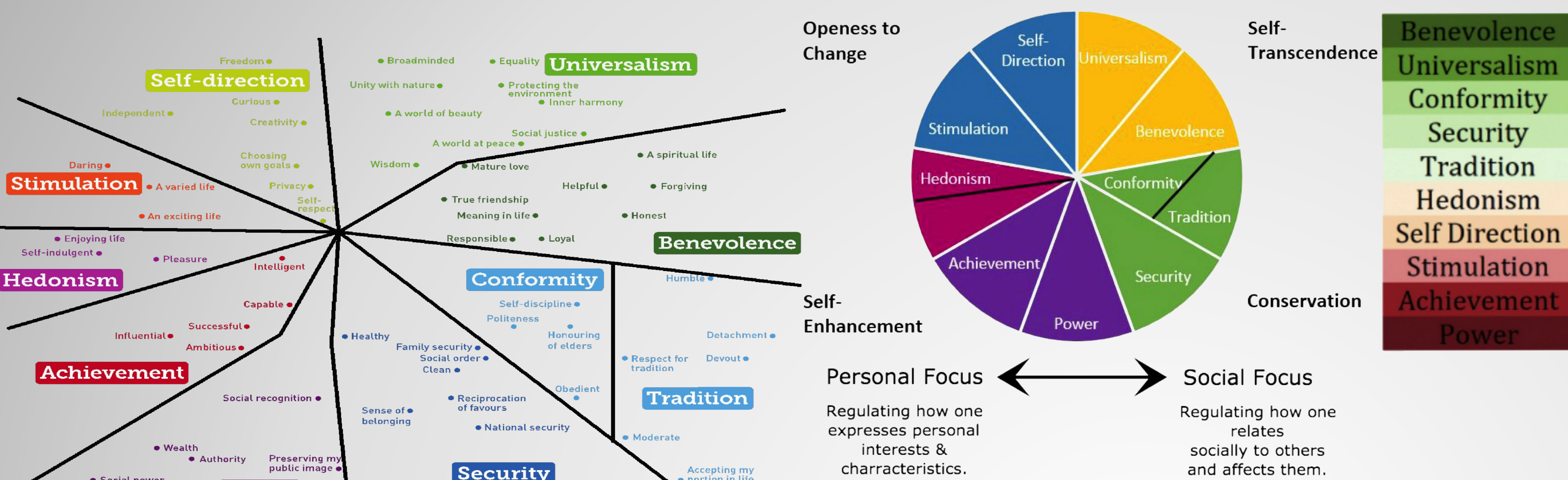


\*Upendra Kumar, Aishwarya N Reganti, Tushar Maheshwari, Tanmoy Chakraborty & Amitava Das  
Indian Institute of Information Technology (IIIT), Sri City, AP, India, 517588

\*University of Maryland, College Park, USA, 20742

{upendra.k14,aishwarya.r14, tushar.m14, amitava.das}@iiits.in, \*tanchak@umiacs.umd.edu

## 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.

HOW MUCH LIKE YOU IS THIS PERSON?	Very much like me	Like me	Some what like me	A little 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. <b>SD</b>	6	5	4	3	2
2. It is important to her to be rich. She wants to have a lot of money and expensive things. <b>PO</b>	6	5	4	3	2
3. She thinks it is important that every person in the world be treated equally. She believes everyone should have equal opportunities in life. <b>UN</b>	6	5	4	3	2
4. It is important to her to show her abilities. She wants people to admire what she does. <b>AC</b>	6	5	4	3	2
5. It is important to her to live in secure surroundings. She avoids anything that might endanger her safety. <b>SE</b>	6	5	4	3	2

### Corpus Statistics

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

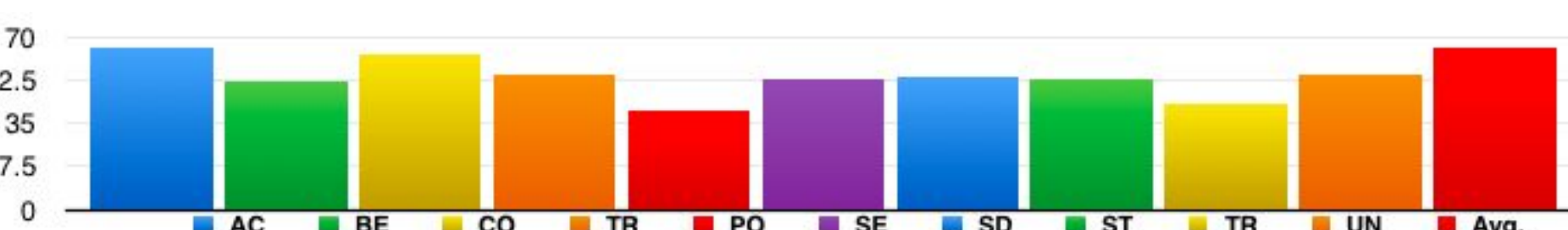


Figure 1: Values Class Distribution in the Twitter Corpus.

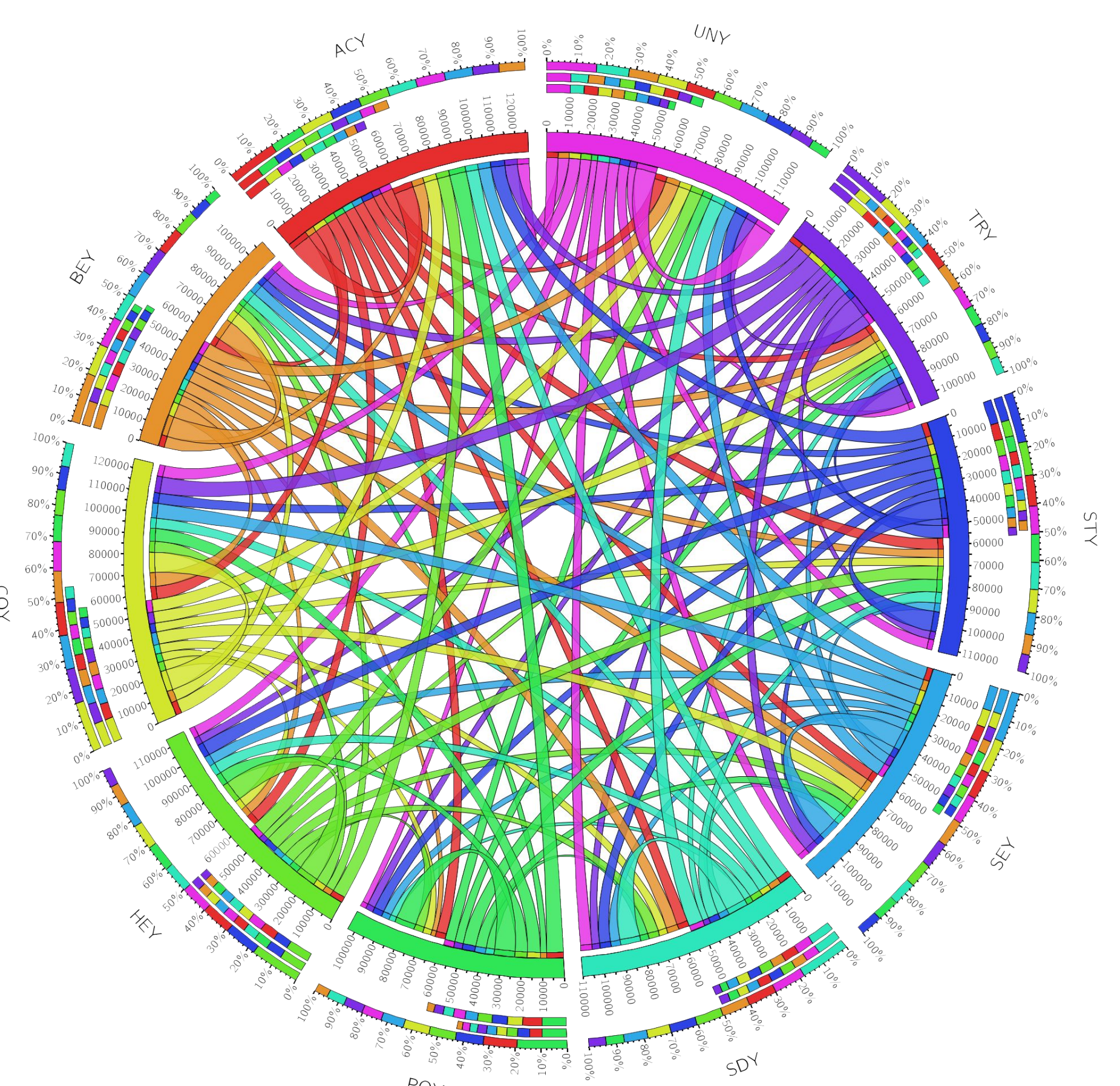


Figure 2: Schwartz Values fuzziness for Twitter Values corpus using Circos. The width of each outgoing band from any value represents the degree of membership of that Value with other Values.

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

	AC	BE	CO	HE	PO	SE	SD	ST	TR	UN	SCI	SC2	SC4	SC3
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	66.0	66.0	66.0	97.19
West/Central India	100.0	100.0	100.0	100.0	57.97	15.0	100.0	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]

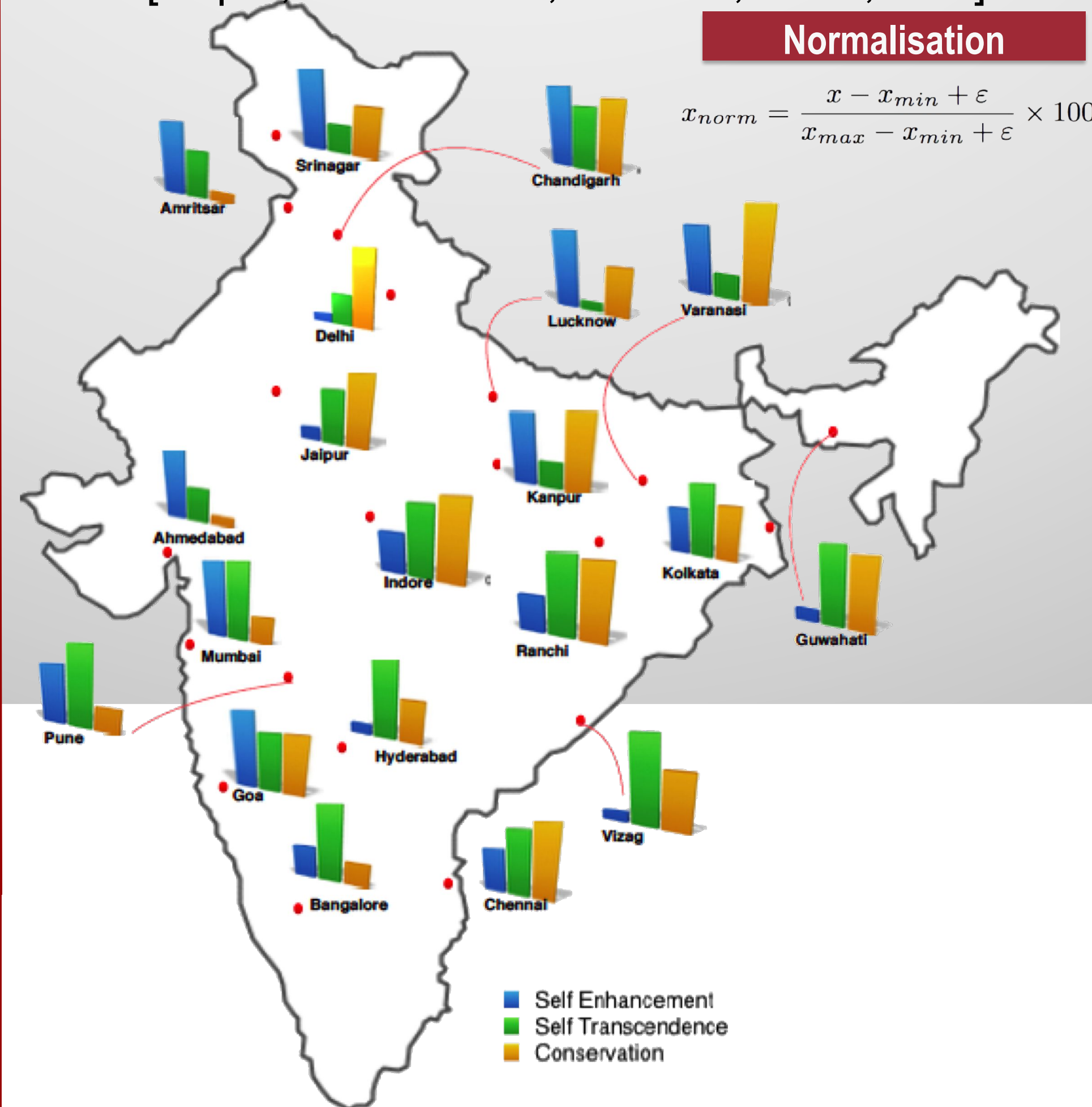


Figure 3: "Unity in Diversity": City-Wise Indian Values: An analysis on Twitter data of 20 most populous cities of India.

## 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)

	Achievement	Benevolence	Conformity	Hedonism	Power	Security	Self-Direction	Stimulation	Tradition
LWC	0.014	0.066	-0.008	-0.077	-0.013	-0.035	0.090	-0.037	-0.029
PREPS	-0.002	0.039	0.001	-0.001	-0.077	0.033	0.040	0.010	-0.003
SPACE	0.028	0.015	0.017	-0.008	-0.073	0.000	0.073	-0.015	0.033
UP	-0.024	0.061	-0.009	-0.008	-0.012	-0.018	-0.018	0.007	0.062
OCCUP	0.042	-0.021	0.006	-0.078	-0.058	0.004	-0.011	-0.002	0.040
ACHIEV	0.030	0.054	-0.016	-0.066	-0.039	0.008	-0.010	0.008	0.037
INCL	-0.016	0.006	-0.001	-0.004	-0.007	-0.009	0.031	-0.006	0.008
SENSES	-0.020	0.006	0.015	-0.049	-0.089	-0.038	0.063	-0.033	0.009
PAST	-0.021	0.015	0.022	-0.056	-0.087	-0.004	0.036	-0.033	0.010
PHYSICAL	-0.068	0.030	0.031	-0.024	-0.073	-0.009	-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	0.060	0.019	0.000	-0.040	-0.002	0.041	0.077	-0.019
EXCL	-0.011	0.093	-0.017	-0.029	-0.038	-0.031	0.035	-0.011	-0.011
COGMECH	-0.015	0.069	-0.046	-0.058	-0.082	-0.046	0.090	-0.003	-0.052
DISCSEP	-0.002	0.039	0.012	-0.013	-0.003	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	-0.049	-0.065	0.074	0.032	-0.036
NEGATE	-0.020	0.002	-0.026	-0.023	-0.077	-0.013	0.036	-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	0.016	-0.006	-0.079	-0.022	-0.018	0.011	-0.037	0.003
NEGEMO	-0.037	0.034	-0.049	-0.055	-0.077	-0.010	0.087	0.019	-0.026
SAND	-0.070	0.006	0.013	-0.020	-0.073	-0.034	0.085	0.027	-0.016
INHB	-0.001	-0.008	0.068	0.021	-0.059	-0.021	0.059	0.025	-0.086
AGE	-0.001	0.031	0.006	-0.074	-0.075	0.035	0.093	-0.026	0.041
POSSEM	-0.017	0.020	0.013	-0.071	-0.022	-0.025	0.030	-0.051	0.014
OPTIM	0.017	0.086	0.044	-0.098	-0.070	0.004	-0.024	-0.036	0.034
INSIGHT	-0.012	0.075	-0.093	-0.078	-0.023	-0.060	0.045	-0.015	-0.084
PRESENT	0.014	0.093	-0.017	-0.031	-0.030	-0.016	0.080	0.006	-0.008
ASSENT	-0.026	0.044	-0.070	0.006	-0.035	-0.090	0.057	0.072	-0.012
BODY	-0.008	0.060	0.021	0.015	-0.033	0.004	0.055	0.035	-0.039
PORESEL	-0.036	0.076	-0.033	0.009	-0.060	-0.072	-0.041	-0.014	0.001
ANX	0.020	-0.053	-0.092	0.003	-0.008	0.007	0.006	0.074	-0.081
SOCIAL	-0.017	0.018	-0.020	-0.066	-0.097	0.021	0.024	-0.067	0.021
COM M	0.039	0.035	0.053	-0.096	-0.082	-0.021	0.005	-0.016	0.002
CERTAIN	-0.030	0.026	0.089	-0.058	-0.096	0.048	0.013	-0.091	0.072
SURE	-0.060	0.011	-0.065	0.049	-0.039	-0.035	0.002	0.036	-0.090
JOB	0.035	-0.080	-0.015	0.020	0.014	-0.058	-0.009	0.007	-0.016
METAPH	0.015	0.030	0.036	-0.079	-0.088	0.042	-0.039	-0.031	-0.039
RELIG	0.025	0.007	0.036	-0.044	-0.086	0.046	-0.046	-0.030	-0.030
TENTAT	-0.040	0.024	0.027	-0.001	-0.092	-0.081	0.002	0.050	-0.037
SLEEP	-0.002	-0.021	0.053	0.021	-0.023	-0.069	0.055	0.027	0.038
DEATH	-0.006	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	-0.082	0.030	0.054
SCHOOL	0.058	0.028	0.078	-0.060	-0.078	-0.053	-0.011	-0.029	0.041
LEISURE	0.029	0.042	0.066	0.012	-0.014	0.072	-0.036	-0.096	0.089
HOME E	-0.005	0.027	0.078	0.006	-0.004	-0.029	-0.083	-0.086	0.090
SMILES	0.006	0.050	0.072	0.007	-0.025	-0.007	0.034	-0.070	-0.016
FEEL	-0.054	0.049	-0.066	-0.026	-0.073	-0.013	0.018	-0.036	-0.030
SPORTS	-0.005	-0.021	-0.030	0.023	-0.013	-0.096	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

Values Classifier	Achievement	Benevolence	Conformity	Hedonism	Power
SMO	LR	RF	SMO	LR	RF
LWC	80.93	80.93	80.10	78.75	77.38
+Topic	74.66	80.85	80.65	69.21	78.20
+Lexica	71.10	73.70	69.70	71.90	69.90
+Non-Linguistic	74.11	80.38	80.60	68.40	78.47
+Speech-Act	81.10	76.40	68.00	81.00	73.00

Values Classifier	Security	Self-Direction	Stimulation	Tradition	Universalism
SMO	LR	RF	SMO	LR	RF
LWC	76.29	75.75	74.11	83.38	83.38
+Topic	70.57	74.93	75.48	76.84	83.38
+Lexica	70.60	74.20	69.50	75.60	74.40
+Non-Linguistic	71.18	74.66	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

## 5 Semantic Interpretation of Communities

### SNAP Dataset

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

- ❖ 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