

Happiness

General State of Being

Why Happiness?

- Health
- Productivity
- Relationships
- Philanthropy and Civic Duty

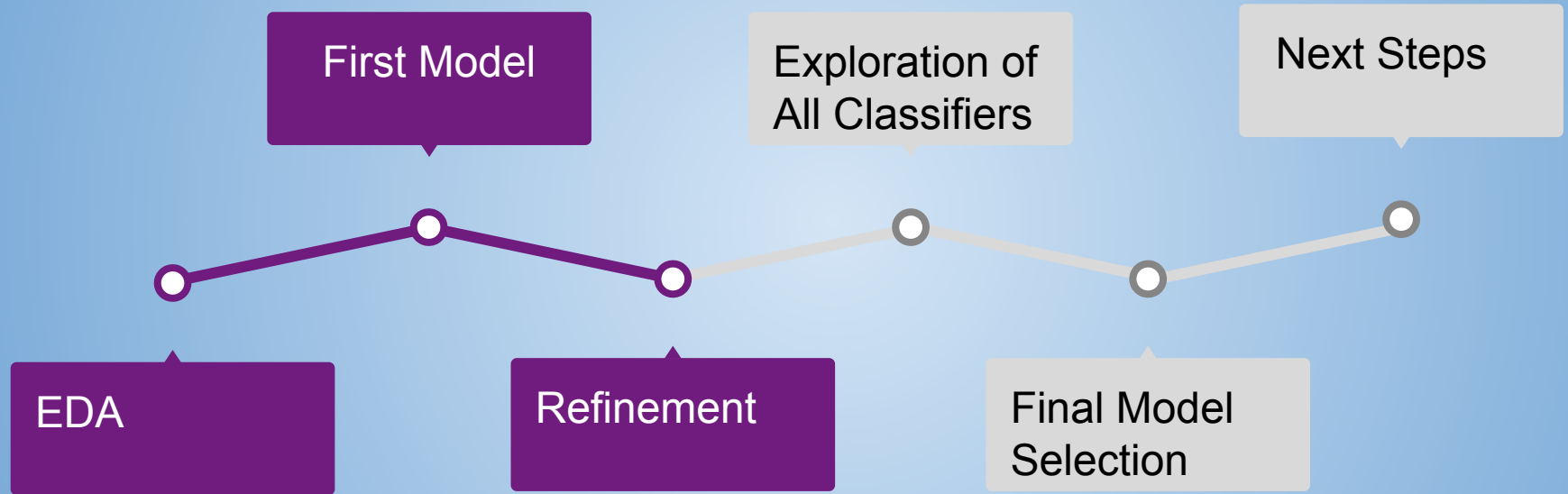
Why GSS?

- Trusted
- Consistent Since 1972
- Used by Policy Makers

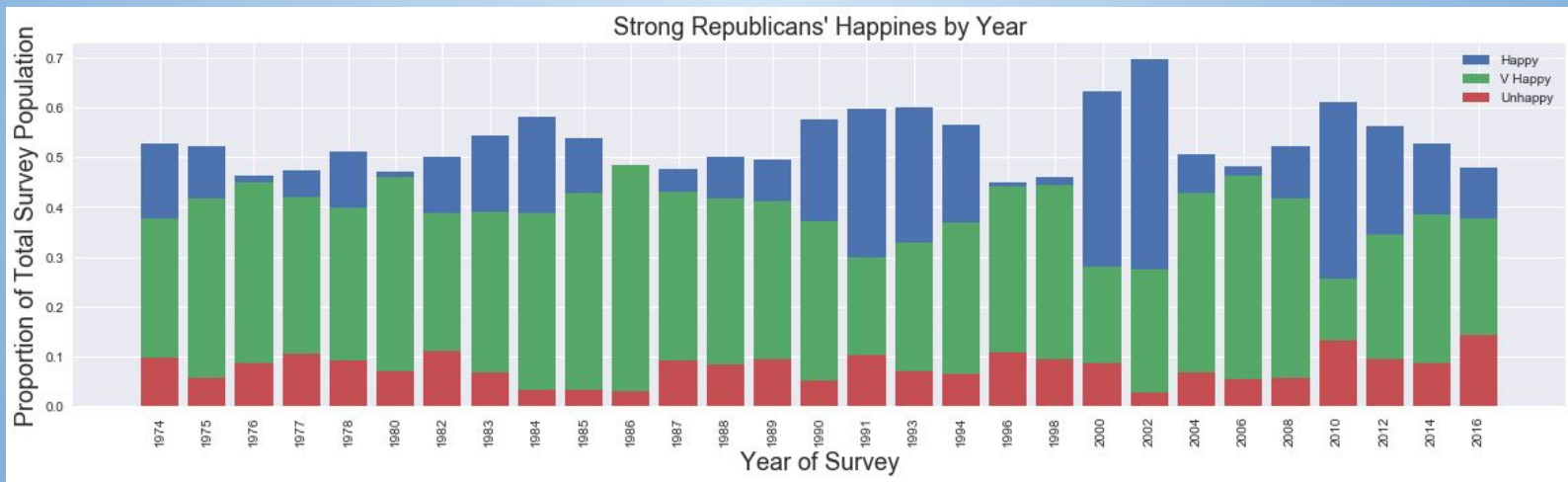
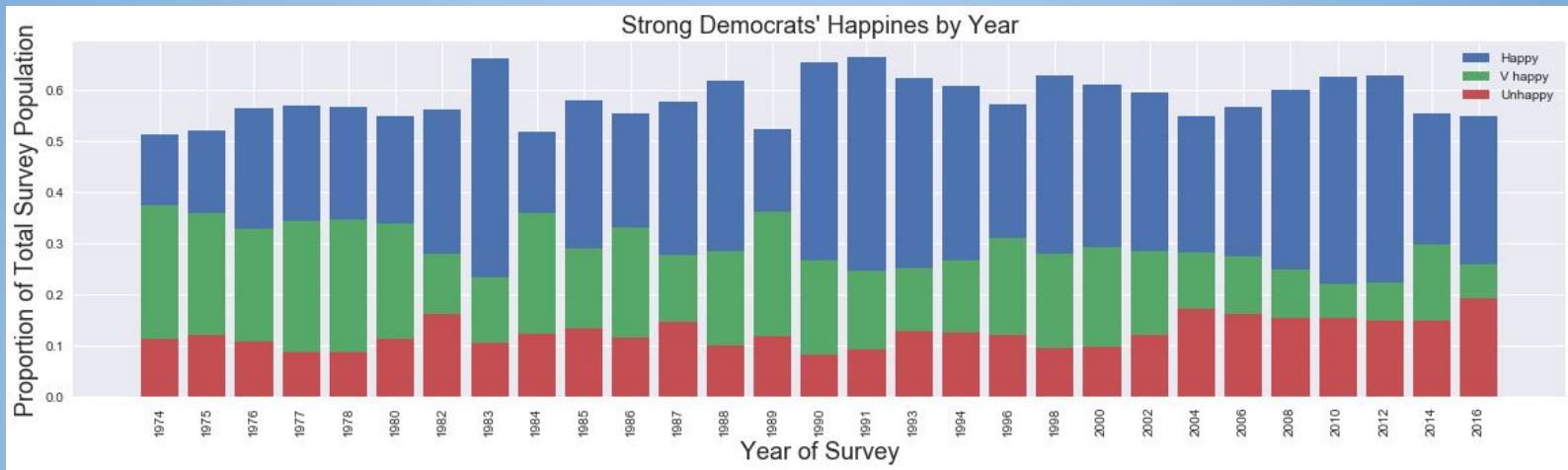
Valid Data?

- 50% of ~ 60,000 Respondents over span of 30 Years
- Converted Many to Ordinal Scale

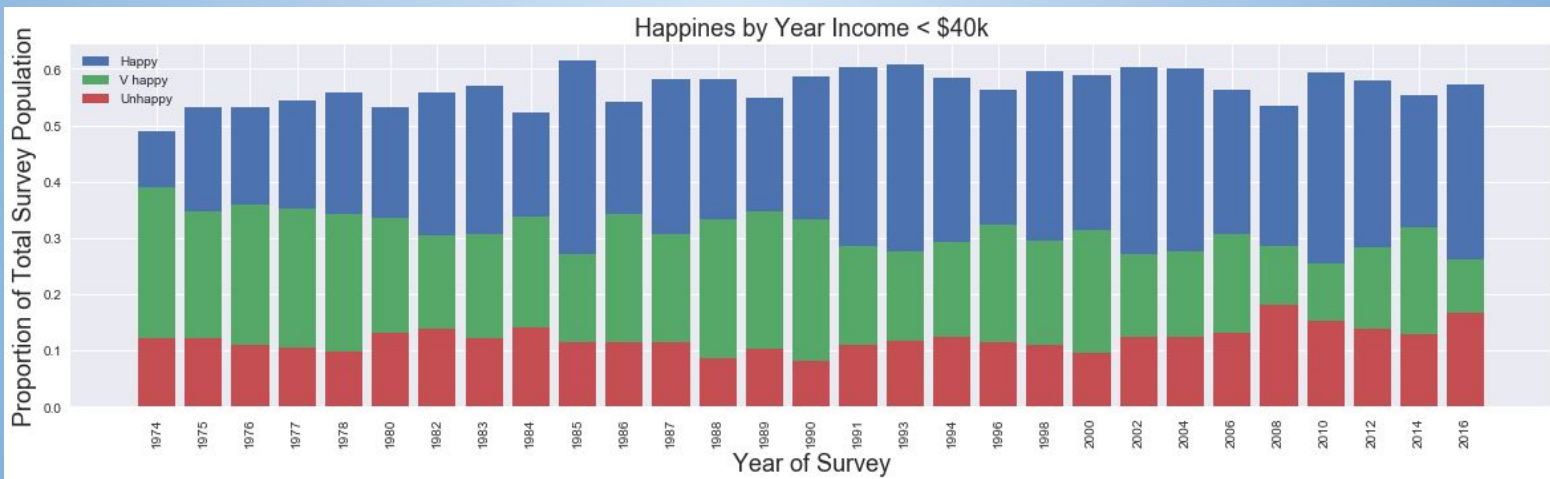
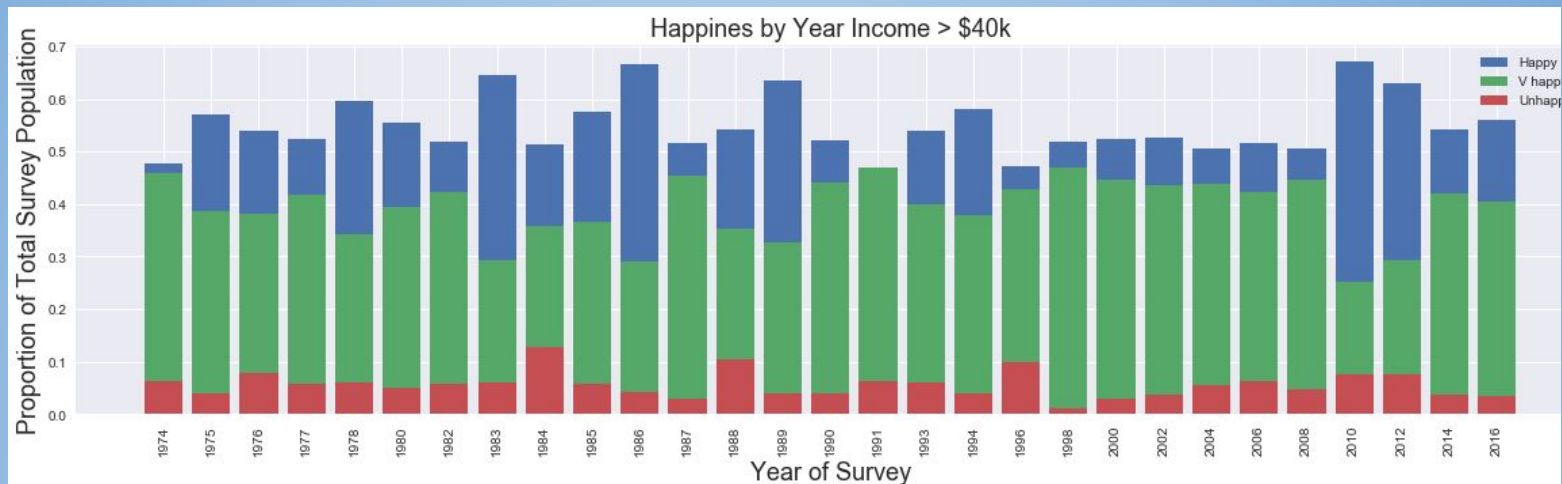
Process



EDA



EDA



Random Forest Initial Accuracy

Accuracy Score: 0.523949

precision recall f1-score support

<i>Very Happy</i>	0.41	0.36	0.38	2830
<i>Don't Know</i>	0.00	0.00	0.00	33
<i>Happy</i>	0.58	0.72	0.64	4914
<i>Not So Happy</i>	0.34	0.08	0.13	1054
<i>Avg / Total</i>	0.49	0.52	0.49	8831

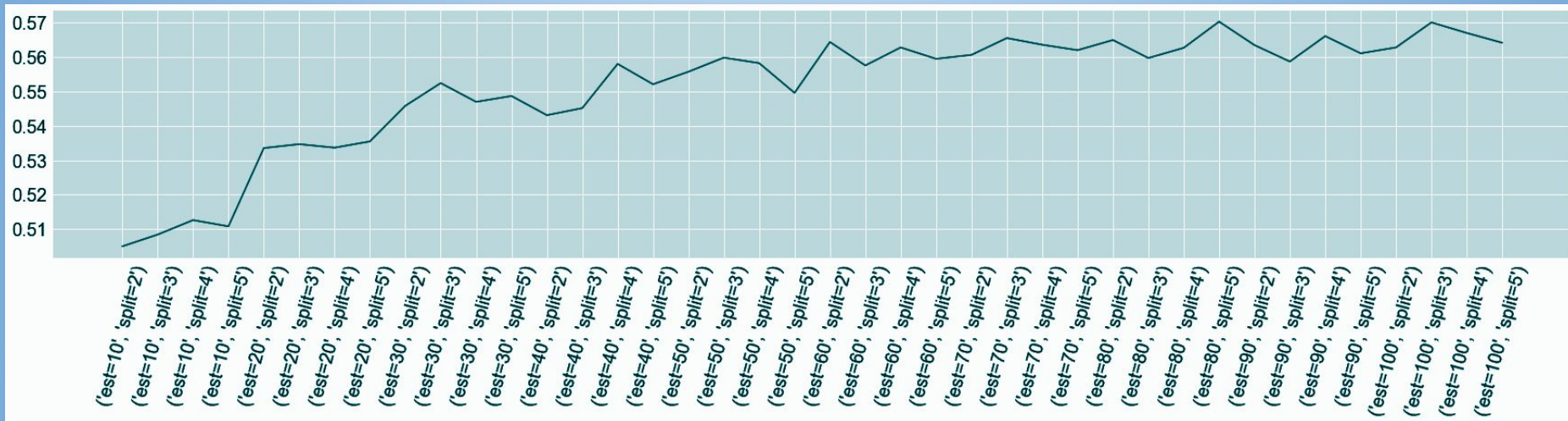
Upsampling (W Rplcment) and Re-Running 3 Classes

Test: 0.554847 **Train:** 0.991410

	<i>precision</i>	<i>recall</i>	<i>f1-score</i>	<i>support</i>
<i>Very Happy</i>	0.48	0.40	0.44	2851
<i>Happy</i>	0.60	0.71	0.65	4933
<i>Not So Happy</i>	0.36	0.20	0.26	1024
<i>Avg / Total</i>	0.53	0.55	0.53	8788

<u><i>Pred</i></u>				
	<i>V Happy</i>	<i>Happy</i>	<i>Not Happy</i>	<i>Total</i>
<i>V Happy</i>	1148	1629	74	2851
<u>Act</u> <i>Happy</i>	1146	3477	290	4933
<i>Not Happy</i>	97	718	209	1024

Grid Search on Tree Size and Min Split



Other Models

Logistic Regression Accuracy: 0.356736

GaussianNB Accuracy: 0.318047

SVC Accuracy: 0.434342

KNN Accuracy: 0.128698

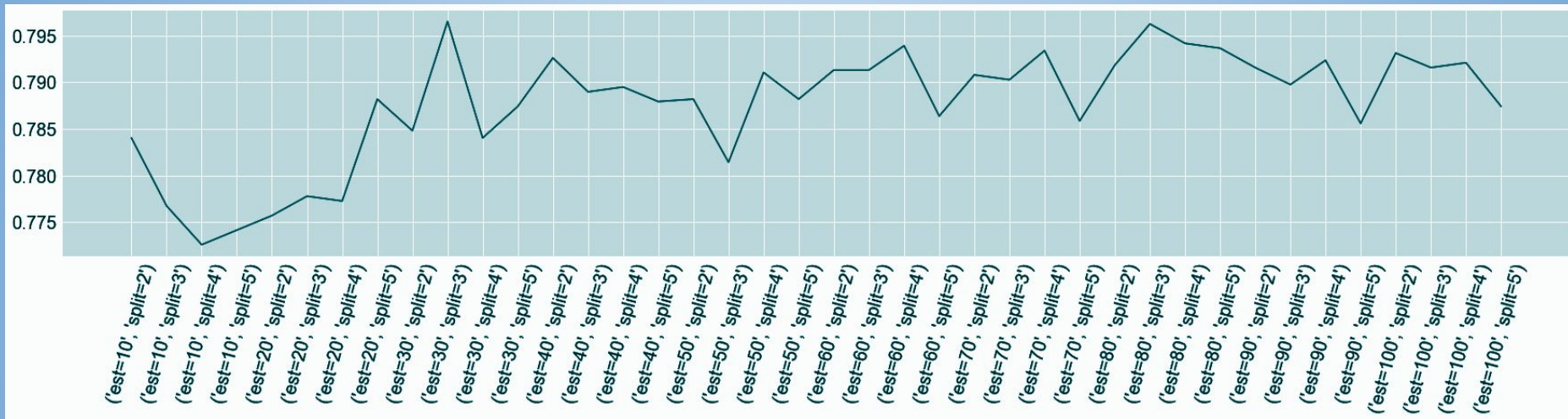
Two Classes Random Forest

Test: 0.784303 Train: 0.982745

	<i>precision</i>	<i>recall</i>	<i>f1-score</i>	<i>support</i>
V Happy	0.85	0.86	0.85	2822
Unhappy	0.60	0.59	0.59	1026
avg / total	0.78	0.78	0.78	3848

Act	Pred	
	<i>V Happy</i>	<i>Unhappy</i>
<i>V Happy</i>	2417	405
<i>Unhappy</i>	425	601

Second Grid Search



Other Models (Scaled)

KNN Accuracy: 0.6564449

	precision	recall	f1-score	support
Happy	0.82	0.68	0.74	2822
Unhappy	0.40	0.61	0.48	1026
avg / total	0.71	0.66	0.67	3848

	VH	UH
VH	1905	917
UH	405	621

SVC Accuracy Score: 0.740124

	precision	recall	f1-score	support
Happy	0.88	0.75	0.81	2822
Unhappy	0.51	0.72	0.60	1026
Avg / total	0.78	0.74	0.75	3848

	VH	UH
VH	2110	712
UH	288	738

Logistic Accuracy Score 0.74376

	precision	recall	f1-score	support
Happy	0.74	0.99	0.85	2822
Unhappy	0.73	0.06	0.11	1026
avg / total	0.73	0.74	0.65	3848

	VH	UH
VH	2799	23
UH	963	63

GaussianNB Accuracy: 0.746101871102

	precision	recall	f1-score	support
Happy	0.76	0.97	0.85	2822
Unhappy	0.60	0.14	0.23	1026
avg / total	0.72	0.75	0.68	3848

	VH	UH
VH	2729	93
UH	884	142

Selecting Classifier and Significant Qs

Feature Importance

Two Class

Satisfaction in Financial Situation

Age

Perceived Relative Family Fin
Situation

Industry

Did Financial Situation Alter?

Year

Income

Party ID

Political Views

Spending on Race Equality

Spending on Arms

Spending on Welfare

Spending on Big City Issues

Three Class

Industry

Age

Perceived Relative Family Fin

Political Views

Party ID

Spending on For. Aid

Income

Satisfaction in Financial Situation

Spending on Big City Issues

Spending on Race Equality

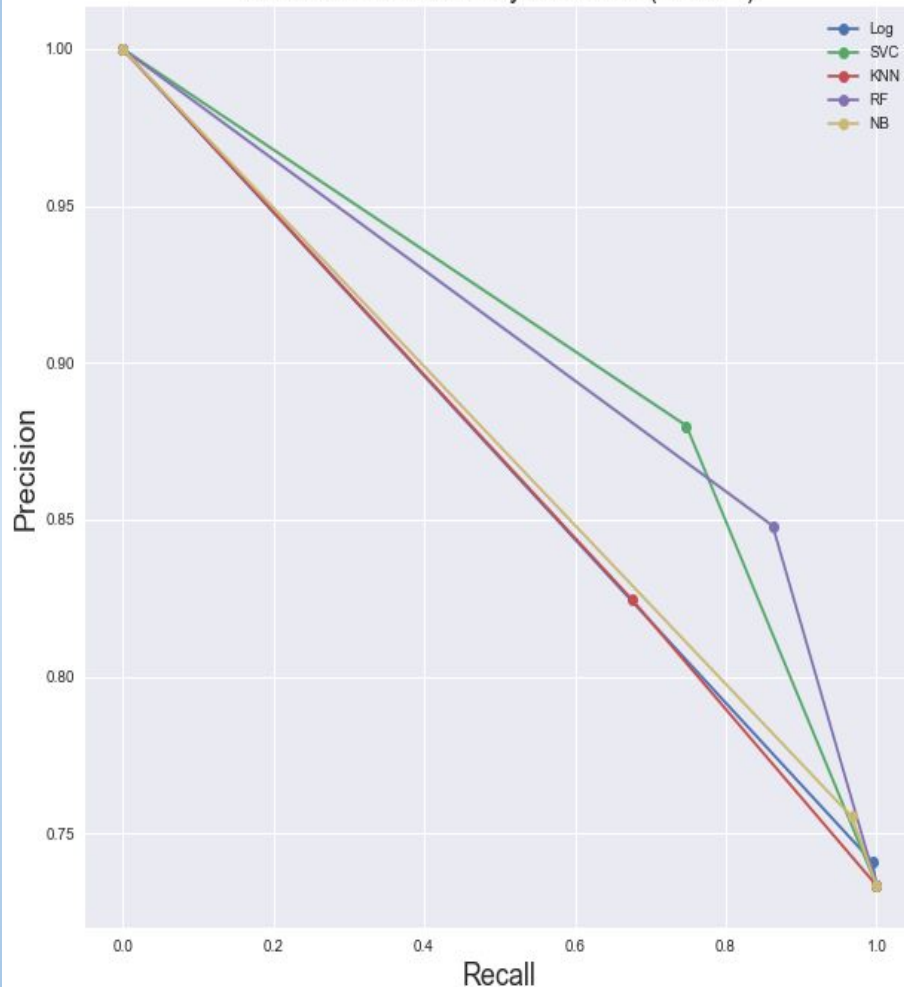
Mobility

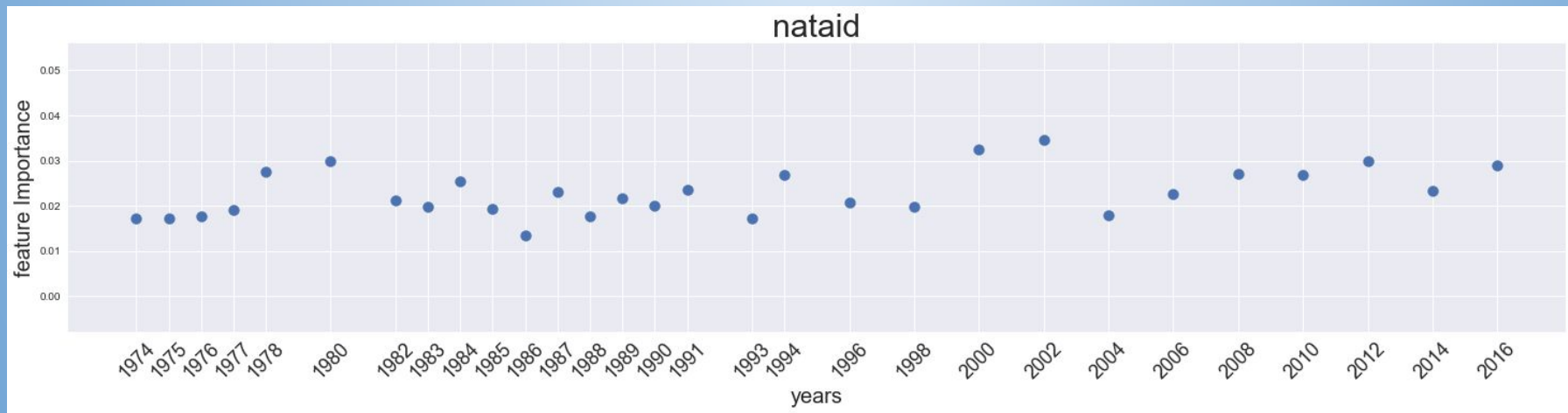
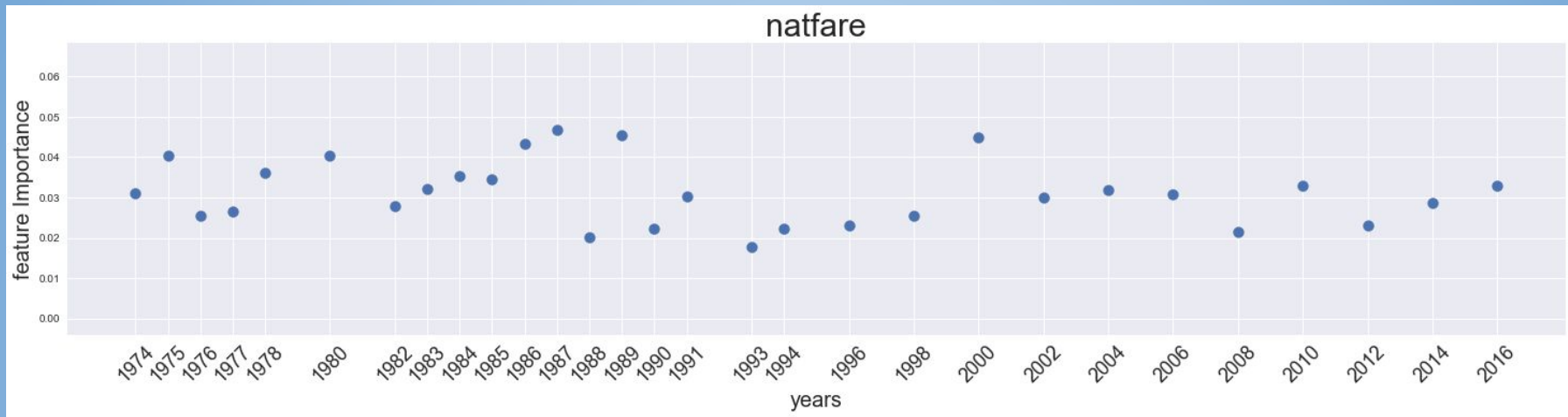
Spending on Arms

Did Financial Situation Alter?

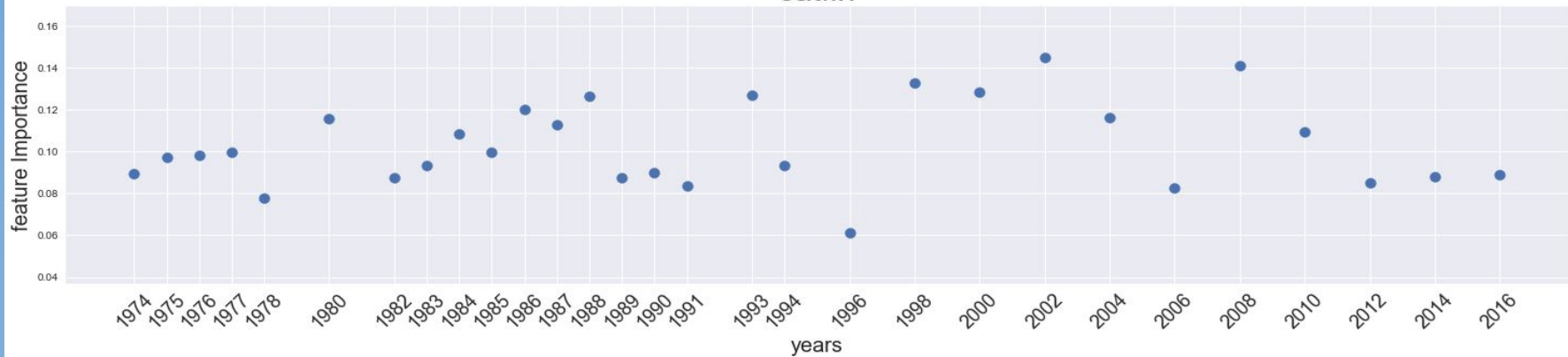
Spending on Welfare

Precision and Recall by Classifier (Class 1)

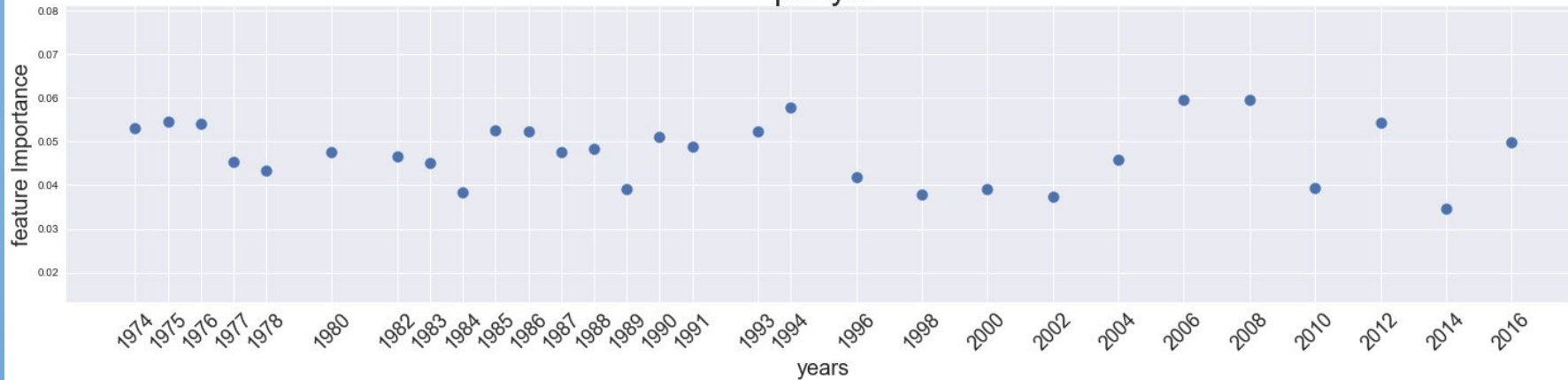




satfin



partyid



Next Steps:

Subsets of Data to Extract Additional Features

Obtain Locations of Respondents (Confidential)

Find Data with More Categories:

V Happy, M Happy, Content, M Discontent, Very Unhappy

Thank you

Appendices

1. *New study shows we work harder when we are happy:*
https://warwick.ac.uk/newsandevents/pressreleases/new_study_shows (cited in
<https://www.theguardian.com/lifeandstyle/2014/nov/03/why-does-happiness-matter>)
2. *Positive feelings may help protect cardiovascular health:*
<https://www.hsph.harvard.edu/news/press-releases/positive-emotions-cardiovascular-health/> (cited in
<https://www.theguardian.com/lifeandstyle/2014/nov/03/why-does-happiness-matter>)
3. *Are We Happy Yet?:*
<http://www.pewsocialtrends.org/2006/02/13/are-we-happy-yet/>