1. Feature Selection:

a. We made a correlation matrix to help us in features selection using .corr() function

	A	B	C	D	E	F	G	H	I	J	K	L
		video_id	title	channel_title	category_id	tags	views	comment_count	comments_disabled	ratings_disabled	video_error_or_removed	VideoPopularity
video_id		1	0.017287353	-0.005785013	-0.009654145	-0.003190847	0.031242683	0.00693229	-0.011345072	-0.006847436	0.004980404	-0.013562092
title		0.017287353	1	0.133635446	0.026597721	0.128174848	-0.030664129	-0.018357967	0.023498481	0.010323843	-0.018501111	-0.003909335
channel_title		-0.005785013	0.133635446	1	0.045880822	0.188482922	-0.030446201	0.033479296	-0.032178316	0.012369248	0.014120534	0.012708468
category_id		-0.009654145	0.026597721	0.045880822	1	0.130229845	-0.166831391	-0.086795631	0.046867834	-0.01225488	-0.031210643	0.071493985
tags		-0.003190847	0.128174848	0.188482922	0.130229845	1	-0.091348468	-0.055729982	-0.002920872	-0.013714444	-0.010896037	0.045941961
views		0.031242683	-0.030664129	-0.030446201	-0.166831391	-0.091348468	1	0.660918775	0.003501187	0.014858562	-0.00130855	-0.259866302
comment_count		0.00693229	-0.018357967	0.033479296	-0.086795631	-0.055729982	0.660918775	1	-0.029537401	-0.014772737	-0.003669129	-0.205667125
comments_disabled		-0.011345072	0.023498481	-0.032178316	0.046867834	-0.002920872	0.003501187	-0.029537401	1	0.326304042	-0.002777946	0.004851968
ratings_disabled		-0.006847436	0.010323843	0.012369248	-0.01225488	-0.013714444	0.014858562	-0.014772737	0.326304042	1	-0.001465558	-0.0341763
video_error_or_removed		0.004980404	-0.018501111	0.014120534	-0.031210643	-0.010896037	-0.00130855	-0.003669129	-0.002777946	-0.001465558	1	0.009484451
VideoPopularity		-0.013562092	-0.003909335	0.012708468	0.071493985	0.045941961	-0.259866302	-0.205667125	0.004851968	-0.0341763	0.009484451	1

b. We have chosen features with correlation more than or equal to 0.04, and we got these features:

```
['category_id', 'tags', 'views', 'comment_count']
```

2. Classification techniques:

a. Logistic Regression:

```
Training Time Taken by Logistic Regression 0.9783844947814941 seconds
Testing Time Taken by Logistic Regression 0.0 seconds
Logistic Regression Accuracy 0.820907509034935
```

b. SVM with Polynomial kernel:

```
Training Time Taken by SVM with Polynomial kernel 28.468857049942017 seconds
Testing Time Taken by SVM with Polynomial kernel 3.912562131881714 seconds
SVM with Polynomial kernel Accuracy 0.7557221255521349   with C= 2 with degree= 3
```

i. hyperparameter tuning:

We increased the Regularization parameter(C) while all other hyperparameters are fixed one of them is the Degree of the polynomial function and we got this table.

Regularization parameter(C)	Degree	Accuracy
0.5	3	72.48025699
0.9	3	73.84553607
2	3	75.57221256

c. Decision Tree:

```
Training Time Taken by Decision Tree 0.09474635124206543 seconds
Testing Time Taken by Decision Tree 0.0009975433349609375 seconds
Decision Tree Accuracy 0.9234372908579842
```

d. SVM with Gaussian(RBF) kernel:

```
Training Time Taken by SVM with Gaussian(RBF) kernel 91.72661781311035 seconds
Testing Time Taken by SVM with Gaussian(RBF) kernel 12.046751499176025 seconds
SVM with Gaussian(RBF) kernel Accuracy 0.9407040556819702  with C= 3 with gamma= 3.1
```

i. hyperparameter tuning:
1. We increased the Regularization parameter(C) while the Variance is fixed.
2. We increased the Variance while the Regularization parameter(C) is fixed.
   In row number 7 we got the **Highest Accuracy 94% of all rows and also of all Models.**

	Regularization parameter(C)	Variance(gamma)	Accuracy
0	0.1	0.8	81.93012984
1	0.8	0.8	90.2556552
2	1	0.8	90.67059296
3	3	0.8	93.09329407
4	3	1	93.07990898
5	3	2	93.77593361
6	3	3.1	**94.07040557**
7	3	3.2	93.99009503

3. Conclusion:
a. classification accuracy bar graph: