```python
In [1]: import pandas as pd
        from nltk.tokenize import word_tokenize
        from collections import defaultdict
        from nltk.corpus import wordnet as wn
        from nltk.stem import WordNetLemmatizer
        from nltk import pos_tag
        from nltk.corpus import stopwords
        import joblib
        from sklearn.metrics import accuracy_score
```

```python
In [2]: corpus = pd.read_csv(r"./Sample Data 2.csv")
```

```python
In [3]: # Remove blank rows
        corpus['Description'].dropna(inplace=True)
        # Change all text to lower case
        corpus['Description'] = [entry.lower() for entry in corpus['Description']]
        # Tokenization
        corpus['Description']= [word_tokenize(entry) for entry in corpus['Description']]
        corpus.head()
```

Out[3]:

	Genre	Description
0	Arts	[bestselling, author, elizabeth, gilbert, retu...
1	Video Games	[the, leaders, in, gaming, news, hand-pick, th...
2	Business News	[the, tech, m, &, a, podcast, pulls, from, the...
3	Management & Marketing	[a, podcast, about, entrepreneurs, who, quit, ...
4	Medicine	[a, podcast, about, how, doctors, think, ., pr...

```python
In [4]: # Remove stop words, non-numeric and perfom Word Stemming/Lemmenting.
        tag_map = defaultdict(lambda : wn.NOUN)
        tag_map['J'] = wn.ADJ
        tag_map['V'] = wn.VERB
        tag_map['R'] = wn.ADV
        for index,entry in enumerate(corpus['Description']):
            Final_words = []
            word_Lemmatized = WordNetLemmatizer()
            for word, tag in pos_tag(entry):
                if word not in stopwords.words('english') and word.isalpha():
                    word_Final = word_Lemmatized.lemmatize(word,tag_map[tag[0]])
                    Final_words.append(word_Final)
            corpus.loc[index,'description_final'] = str(Final_words)
```

```python
In [5]: # Save Models
        NBmodel = joblib.load("NBmodel")
        SVMmodel = joblib.load("SVMmodel")
```

```python
In [6]: # Predict the categories of the test data
        NB_predicted_categories = NBmodel.predict(corpus['description_final'])
        SVM_predicted_categories = SVMmodel.predict(corpus['description_final'])
```

```python
In [7]: print("Naive Bayes Accuracy Score -> ",accuracy_score(NB_predicted_categories, corpus['Genre'])*100)
        print("SVM Accuracy Score -> ",accuracy_score(SVM_predicted_categories, corpus['Genre'])*100)

        Naive Bayes Accuracy Score ->  48.16204051012753
        SVM Accuracy Score ->  52.16304076019005
```

```python
In [8]: # Join the predictions to the corpus
        corpus['NB prediction'] = NB_predicted_categories
        corpus['SVM prediction'] = SVM_predicted_categories
        corpus['SVM probability'] = [[max(i)] for i in SVMmodel.predict_proba(SVM_predicted_categories)]
```

```python
In [9]: corpus.head(50)
```

Out[9]:

	Genre	Description	description_final	NB prediction	SVM prediction	SVM probability
0	Arts	[bestselling, author, elizabeth, gilbert, retu...	['bestselling', 'author', 'elizabeth', 'gilber...	Careers	Literature	[0.1591386298538592]
1	Video Games	[the, leaders, in, gaming, news, hand-pick, th...	['leader', 'game', 'news', 'day', 'hot', 'news...	Video Games	News & Politics	[0.9749585562910643]
2	Business News	[the, tech, m, &, a, podcast, pulls, from, the...	['tech', 'podcast', 'pull', 'best', 'tech', 'm...	Gadgets	Gadgets	[0.07006283535605352]
3	Management & Marketing	[a, podcast, about, entrepreneurs, who, quit, ...	['podcast', 'entrepreneur', 'quit', 'job', 'st...	Careers	Careers	[0.07006283535605352]
4	Medicine	[a, podcast, about, how, doctors, think, ,, pr...	['podcast', 'doctor', 'think', 'present', 'fig...	Medicine	Personal Journals	[0.34869915425887493]
5	Christianity	[through, this, podcast, ,, john, and, lisa, b...	['podcast', 'john', 'lisa', 'bevere', 'hope', ...	Christianity	Christianity	[0.1132830671817752]
6	Comedy	[the, official, podcast, of, comedians, ethan,...	['official', 'podcast', 'comedian', 'ethan', '...	Comedy	Comedy	[0.974925115510076]
7	Performing	[an, old, time, radio, podcast, of, the, 1940s...	['old', 'time', 'radio', 'podcast', 'superman'...	Performing	Performing	[0.07000310398563517]
8	Medicine	[ucsf, 's, osher, center, for, integrative, me...	['ucsf', 'osher', 'center', 'integrative', 'me...	Medicine	Medicine	[0.9532550037987703]
9	Language Courses	[russian, teacher, daria, will, help, you, to,...	['russian', 'teacher', 'daria', 'help', 'impro...	Language Courses	Language Courses	[0.9981583490381192]
10	Outdoor	[out, there, is, a, podcast, that, explores, b...	['podcast', 'explore', 'big', 'question', 'int...	Personal Journals	Outdoor	[0.6434541530885608]
11	Gadgets	[the, latest, cell, phone, reviews, and, news,...	['late', 'cell', 'phone', 'review', 'news', 'h...	Gadgets	Gadgets	[0.07006283535605352]
12	Video Games	[the, indoor, kids, is, n't, just, about, vide...	['indoor', 'kid', 'video', 'game', 'video', 'g...	Video Games	Video Games	[0.2011958959345628]
13	History	[welcome, to, the, true, crime, enthusiast, po...	['welcome', 'true', 'crime', 'enthusiast', 'po...	History	History	[0.9997630066869292]
14	Comedy	[welcome, to, the, amazon, book, club, !, we, ...	['welcome', 'amazon', 'book', 'club', 'take', ...	Literature	Literature	[0.1591386298538592]
15	Higher Education	[stanford, innovation, lab, is, brought, to, y...	['stanford', 'innovation', 'lab', 'bring', 'st...	Higher Education	Higher Education	[0.3599822428397227]
16	Video Games	[the, touchcarde, show, is, an, irreverent, i...	['touchcarde', 'show', 'irreverent', 'io', 'v...	Video Games	Video Games	[0.2011958959345628]
17	Natural Sciences	[welcome, to, blueshift, ,, produced, by, the,...	['welcome', 'blueshift', 'produce', 'astrophys...	Natural Sciences	Natural Sciences	[0.12507518162219908]
18	Philosophy	[an, entertaining, podcast, about, self-...	['entertaining', 'podcast', 'discovery', 'titl...	TV & Film	TV & Film	[0.9986146908335543]
19	Social Sciences	[[, µ≠łə°lù"ΪΪοŝ,], ſ₂†íéâÎÐâіùò, іàòïç ˉ∞...	[]	Video Games	Shopping	[0.1923683595942046]
20	News & Politics	[the, young, turks, is, home, of, the, progres...	['young', 'turk', 'home', 'progressive', 'cenk...	News & Politics	News & Politics	[0.9749585562910643]
21	Higher Education	[authors, tina, kaufman, &, ticiano, alegre, d...	['author', 'tina', 'kaufman', 'ticiano', 'aleg...	Language Courses	Medicine	[0.9532550037987703]
22	Places & Travel	[this, is, the, podcast, for, all, things, dis...	['podcast', 'thing', 'disney', 'world', 'join'...	Places & Travel	Places & Travel	[0.9987554656931928]
23	Medicine	[the, science, radio, news, feature, of, the, ...	['science', 'radio', 'news', 'feature', 'aaa']	Natural Sciences	Natural Sciences	[0.12507518162219908]
24	National	[diving, deeper, is, a, bi-weekly, program, fe...	['dive', 'deeper', 'program', 'featuring', 'di...	Natural Sciences	Natural Sciences	[0.12507518162219908]
25	Design	[hello, atelier, explores, what, it, means, to...	['hello', 'atelier', 'explore', 'mean', 'worki...	Design	Design	[0.9897660754707707]
26	Science & Medicine	[, the, conversations, most, vital, to, our,...	['conversation', 'vital', 'survival', 'quinn',...	Natural Sciences	Natural Sciences	[0.12507518162219908]
27	Outdoor	[hi, ,, i, 'm, tim, burnett, and, this, is, th...	['hi', 'tim', 'burnett', 'solo', 'hntr', 'podc...	Careers	Philosophy	[0.9516285889680007]
28	Outdoor	[podcast, by, precision, shooting, podcast]	['podcast', 'precision', 'shoot', 'podcast']	Outdoor	Shopping	[0.1923683595942046]
29	Literature	[hosted, by, john, j., miller, of, national, r...	['host', 'john', 'miller', 'national', 'review...	News & Politics	News & Politics	[0.9749585562910643]
30	Shopping	[interviews, with, the, baglady]	['interview', 'baglady']	Careers	Medicine	[0.9532550037987703]
31	Fitness & Nutrition	[these, are, couch, to, 5k, style, coached, ru...	['couch', 'style', 'coach', 'run', 'podcasts',...	Fitness & Nutrition	Fitness & Nutrition	[0.9454591348821442]
32	Business News	[everybody, has, 2, cents, and, everybody, has...	['everybody', 'cent', 'everybody', 'minute', '...	Language Courses	Local	[0.747706639654181]
33	Places & Travel	[the, amateur, traveler, is, an, online, trave...	['amateur', 'traveler', 'online', 'travel', 's...	Places & Travel	Places & Travel	[0.9987554656931928]
34	Management & Marketing	[the, official, bni, podcast, is, a, weekly, d...	['official', 'bni', 'podcast', 'weekly', 'disc...	Careers	Careers	[0.07006283535605352]
35	National	[in, about, an, hour, bob, hein, ,, steve, leo...	['hour', 'bob', 'hein', 'steve', 'leonard', 'p...	National	National	[0.7061073380252856]
36	Self-Help	[a, podcast, for, young, woman, looking, for, ...	['podcast', 'young', 'woman', 'look', 'common'...	Careers	Self-Help	[0.2791541107038358]
37	National	[from, ted, :, the, american, political, syste...	['ted', 'american', 'political', 'system', 'fo...	National	National	[0.7061073380252856]
38	Society & Culture	[in, today‚äôs, world, there, is, an, awkward,...	['world', 'awkward', 'connection', 'medium', '...	Careers	Careers	[0.07006283535605352]
39	Gadgets	[your, technology, tutor, ,, chet, davis, shar...	['technology', 'tutor', 'chet', 'davis', 'shar...	Gadgets	Gadgets	[0.07006283535605352]
40	Philosophy	[beginner, friendly, if, listened, to, in, ord...	['beginner', 'friendly', 'listen', 'order', 'a...	Philosophy	Philosophy	[0.9516285889680007]
41	TV & Film	[the, snarky, writers, at, wisecrack, love, ri...	['snarky', 'writer', 'wisecrack', 'love', 'ric...	TV & Film	TV & Film	[0.9986146908335543]
42	Careers	[the, weird, entrepreneurs, podcast, is, the, ...	['weird', 'entrepreneur', 'podcast', 'shaolin'...	Management & Marketing	Management & Marketing	[0.6453811433181804]
43	Performing	[gunsmoke, was, a, long-running, old-time, rad...	['gunsmoke', 'radio', 'television', 'western',...	Performing	Performing	[0.07000310398563517]
44	Hobbies	[the, bhooked, podcast, is, your, place, of, c...	['bhooked', 'podcast', 'place', 'crochet', 'in...	Design	Hobbies	[0.07006283535605352]
45	Food	[are, you, a, busy, person, who, just, never, ...	['busy', 'person', 'never', 'get', 'around', '...	Food	Food	[0.9999942369864168]
46	Performing	[when, a, supernatural, threat, drives, mankin...	['supernatural', 'threat', 'drive', 'mankind',...	Design	Shopping	[0.1923683595942046]
47	Comedy	[the, cracked, podcast, is, facts, ,, jokes, ,...	['cracked', 'podcast', 'fact', 'joke', 'lead',...	Comedy	Comedy	[0.974925115510076]
48	Language Courses	[learn, italian, with, free, podcasts, ,, no, ...	['learn', 'italian', 'free', 'podcasts', 'need...	Language Courses	Language Courses	[0.9981583490381192]
49	Language Courses	[easy, spanish, lessons, with, real-life, conv...	['easy', 'spanish', 'lesson', 'conversation', ...	Language Courses	Language Courses	[0.9981583490381192]

```python
In [ ]:
```