Music classifications and pattern recognition techniques in mapping music notes to socio-political events

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1. Introduction

Musical genres are labels created to characterize different types of music. In the past, categorising using musical genres was carried out manually by humans. This is replaced by automatic musical genre classification which can replace the manual procedure. This is a topic which has seen an increased interest recently as one of the cornerstones of the general area of Music Information Retrieval.

Music has a significant cultural and political impact on real-world events bringing positive change and unity into the cultural and political world.

In this project, we implemented a neural and fuzzy techniques for two main aims: (1) automatic musical genre classification and (2) mapping music notes to socio-political events. We study the efficiency of the algorithm by comparing with the historical data.

Figure 1 shows a sequence of tasks for the classification of music. Data is collected for sample music files available in literature. From these files some features were extracted using signal processing techniques. These features are used as training data in the machine learning techniques for model development to do automatic classification.
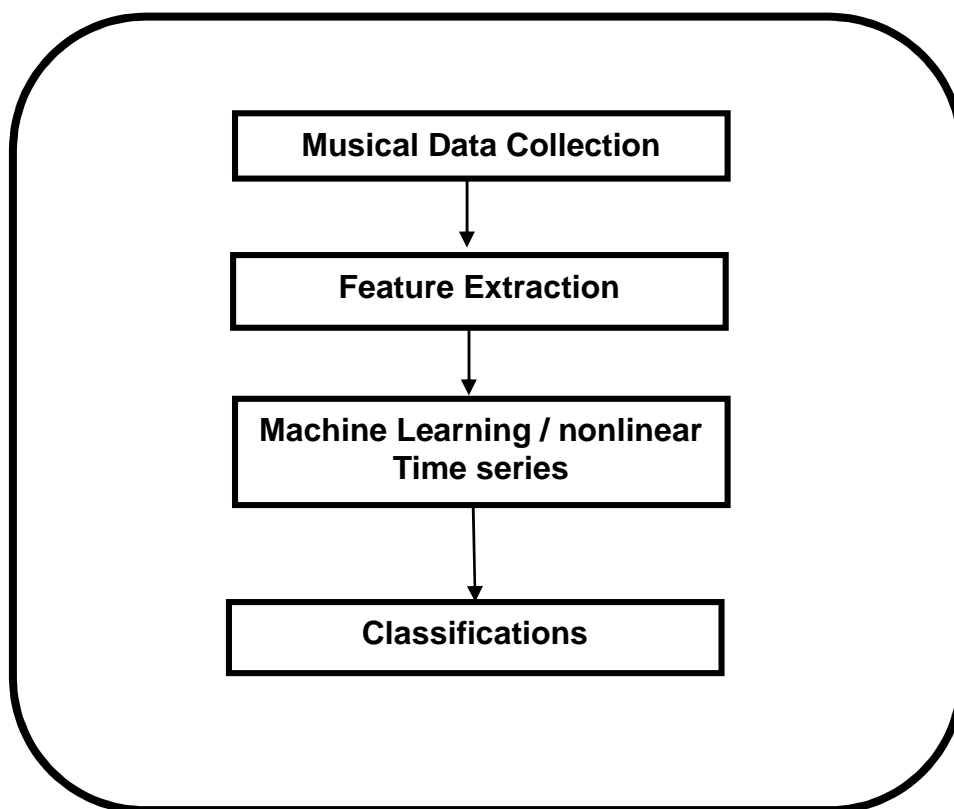

Figure 1: sequence of work for the classification of music

2. Audio Feature Extraction

Audio data are time series where the y-axis is the current amplitude corresponding to a loudspeaker's membrane and the x-axis corresponding to time. In order to obtain high accuracy for classification and segmentation, it is very important to select specific features of audio files. Generally, audio file analysis is based on the nature of the waveform. Therefore, the features are selected on the basis of their numerical values.

2.1 Examples of audio features

<u>Volume</u>

This feature represents the level of sound of the audio signal which is the amplitude of the signals, also referred to as energy or intensity of audio signals. The sum of absolute sample, s, values for each frame, i, is given by

$$Volume = \sum_{i=1}^{n} |s_i|$$

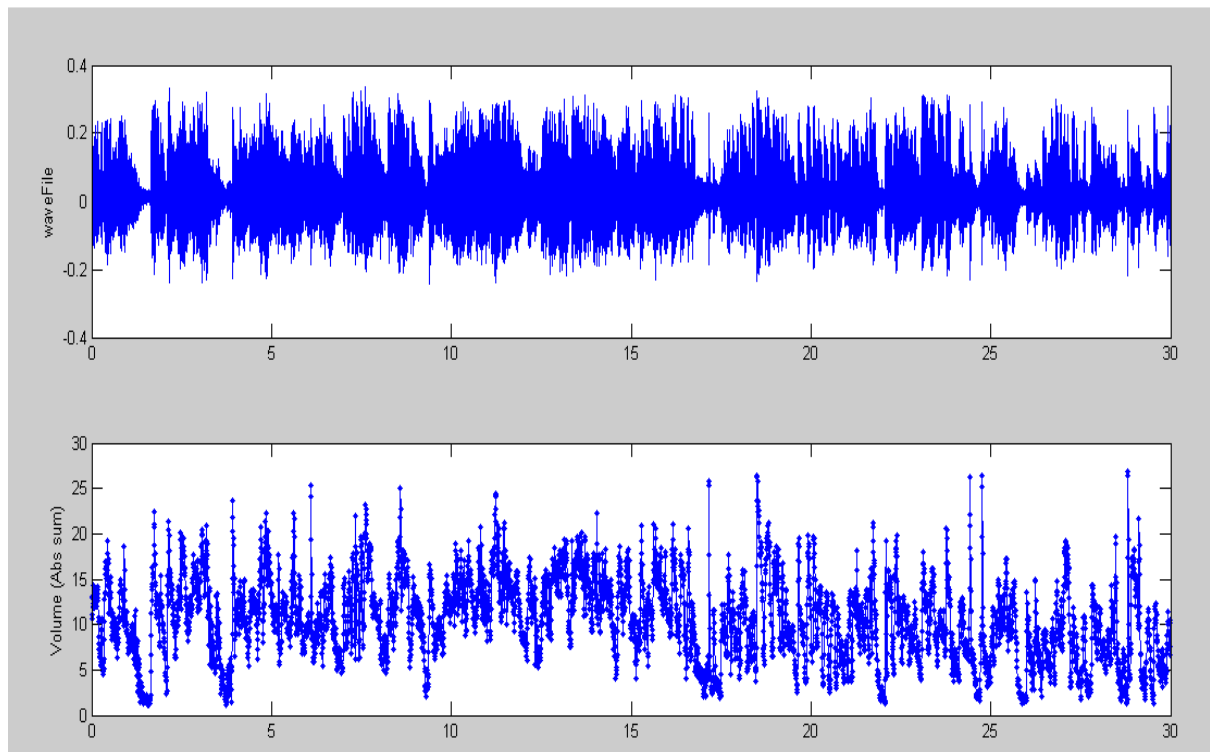Figure 2 shows the measured amplitude from sample music file (top) and the computed volume of the signal (bottom).

Figure 2: sample sound amplitude (top) and computed volume of sample music (bottom)

Zero-crossing rate

The zero-crossing rate is the rate of sign-changes along a signal, i.e., the rate at which the signal changes from positive to negative or vice versa. This feature has been used in both speech recognition and music information retrieval. Figure 3 shows an example of the measured amplitude from sample music file (top) and the computed zero-crossing rate of the signal (bottom).
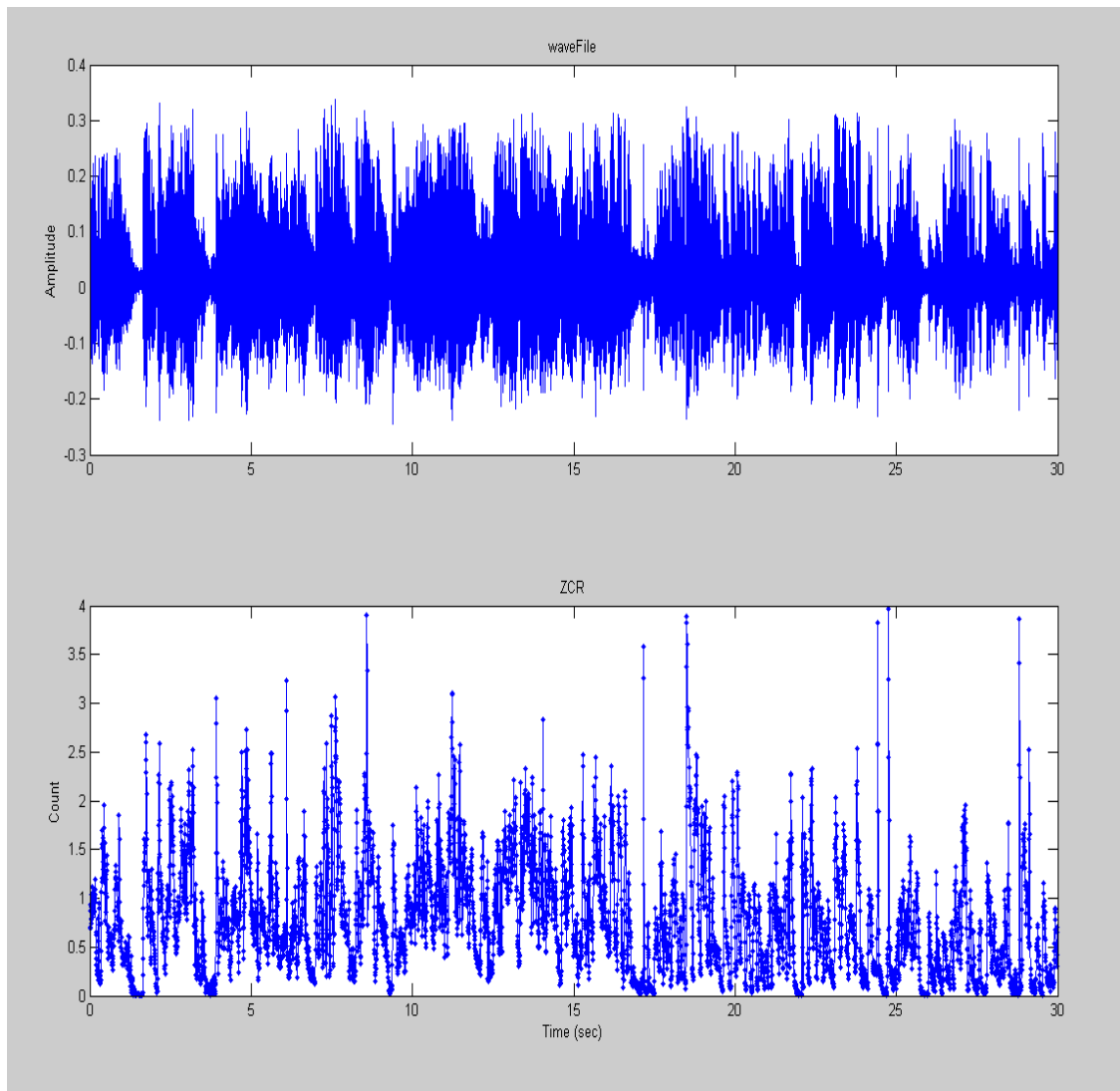

Figure 3: sample amplitude from music file and zero-crossing rate of signal

2.2 Time domain to Frequency domain using Fast Fourier Transform (FFT)

A given signal can be converted between the time and frequency domains using Fast Fourier Transform (other techniques include the wavelets transform and etc.).

The given example (bigband music file) shows the sample sound amplitude in the time domain and the sampled amplitude in the frequency domain after using FFT.
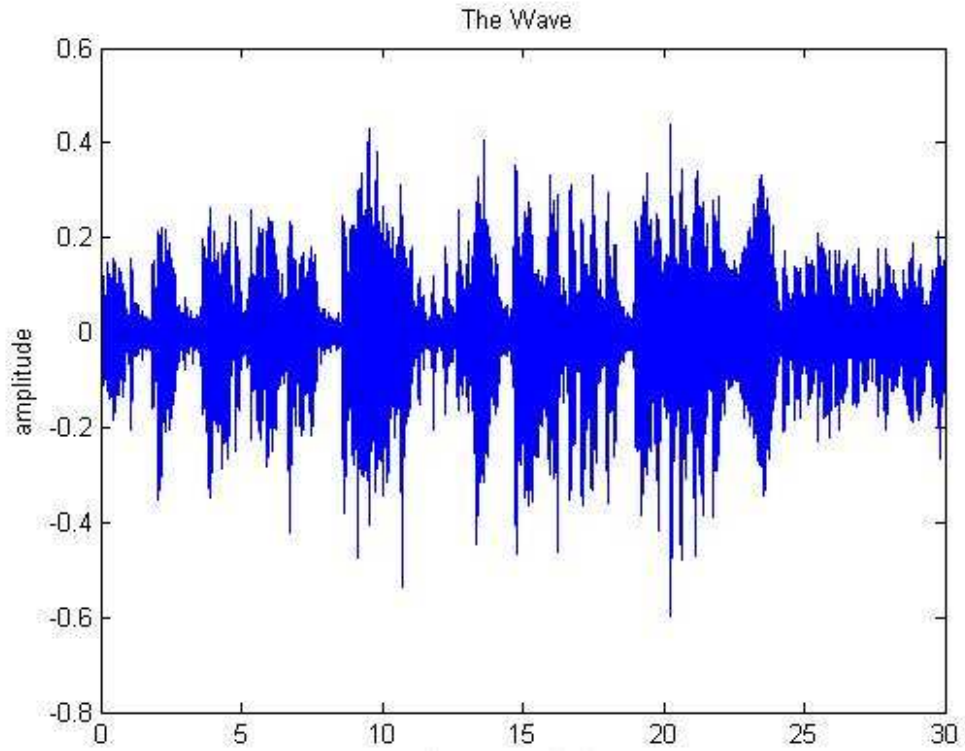
Figure 4: The sample sound amplitude with a duration (in the time domain) of 30 seconds and sampling rate of 22050 samples per second.
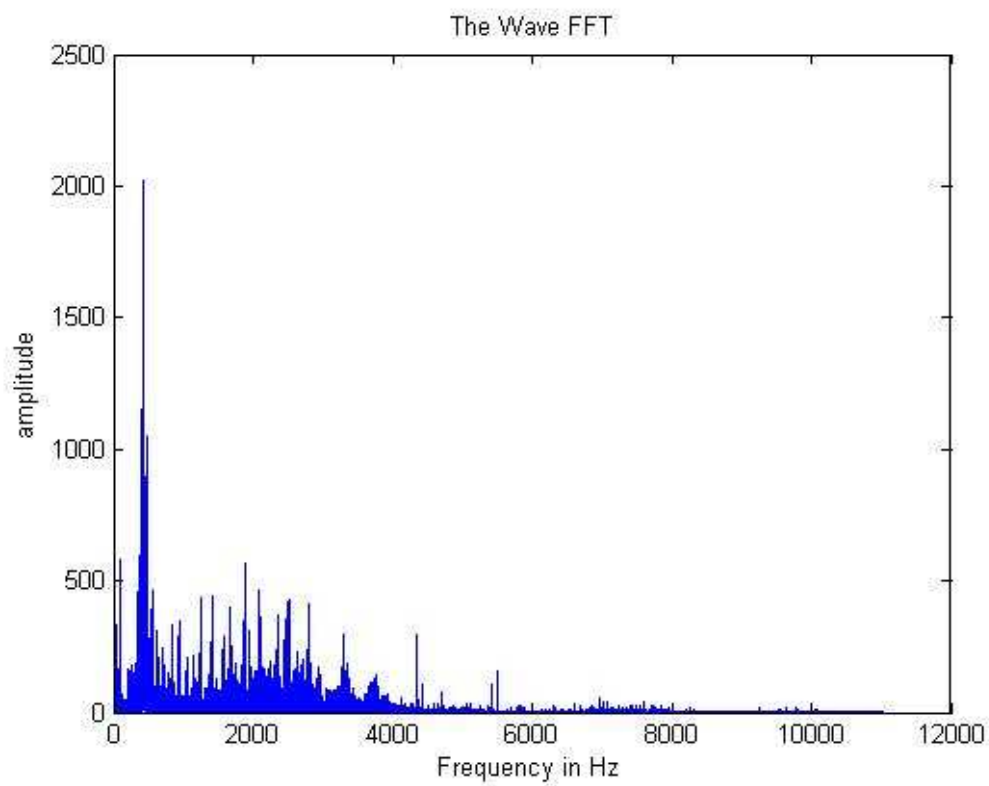

Figure 5: The sampled amplitude in the frequency domain using FFT applied to the sample sound amplitude in Figure 4.

3. Machine learning techniques

The features are obtained and are used as training data in the machine learning techniques. In this section, we will demonstrate how the fuzzy and neural network techniques are used to develop the model.

System modelling based on conventional mathematical tools such as differential equations emphasize a precise description of physical quantities and fail to achieve satisfactory results when dealing with ill-defined and uncertain systems [3]. Therefore, when handling these systems it is preferable to use the fuzzy inference, employing fuzzy if-then rules which can model the qualitative aspects of human knowledge and reasoning processes without precise quantitative analyses and neural networks for the adaptability of the system.

Currently, soft computing research is concerned with the integration of artificial intelligence tools including neural networks, fuzzy technology and evolutionary algorithms. It is possible to solve complex problems by placing them in a hybrid framework (i.e., fuzzy and neural network combined).

3.1 Fuzzy Logic

Fuzzy logic is fundamentally a multi-valued logic [2] that permits intermediate values to be determined between standard assessments like yes/no, true/false, right/wrong, etc.

Figure shows a fuzzy logic system where decisions are made by allowing imprecise data and vague statements such as low, medium, high.
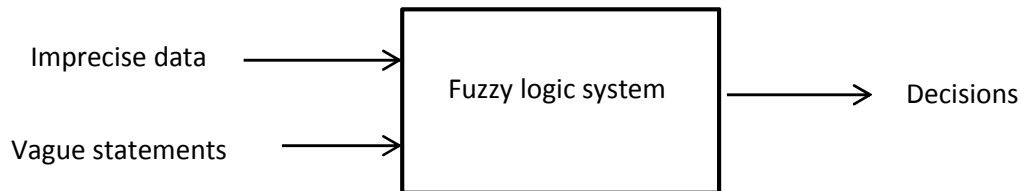
Figure 6: Typical fuzzy system

Fuzzy models
The main two classes of fuzzy models are named Mamdani fuzzy models and Takagi-Sugeno (TS) fuzzy models. In Mamdani models, the antecedents and the consequents are both fuzzy propositions. For instance, a Mamdani fuzzy model of a system with **r** rules is as shown below:

$$R_i: if \ X \ is \ A_i \ then \ y \ is \ B_i, i = 1,2, \dots, r$$

where
X is A_i - Antecedent proposition of the rule.
y is B_i - Consequent proposition of the rule.
X is the input linguistic variable.
Y is the output linguistic variable.

In Takagi-Sugeno models, the antecedents are fuzzy sets and the consequents are crisp functions of the antecedent variables. A TS model of a system with r rules is for instance:

$$R_i : \text{ if X is } A_i \text{ then } y_i = f_i(x), i = 1,2,\dots,r$$

where $f_i(x)$ is a function of the antecedent variables.

With fuzzy models we can represent processes and develop controllers.
Figure 7 describes a typical fuzzy system.

Figure 7: Typical fuzzy system

Fuzzification

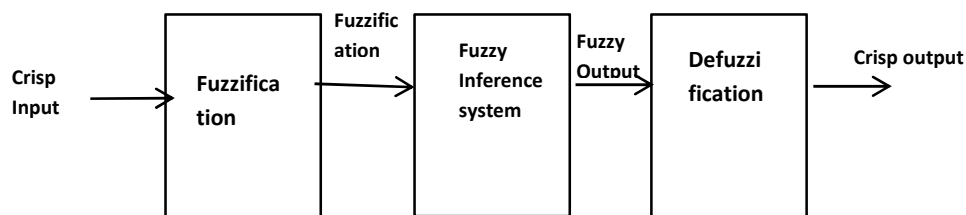The transformation of a crisp input into a matching membership value and as a consequence to a fuzzy value is named Fuzzification and this concept is considered to be an important one in fuzzy logic theory. The fuzzy values are formed by recognizing some of the uncertainties of the exact values and the conversion of these fuzzy values is represented by membership functions.
Negligible errors are available in any practical application and this ends in inaccurate data. To represent these inaccuracies by the membership functions, fuzzification is performed. Due to this, allocating membership values for the exact values may be included in fuzzification.
Allocation of the membership values/functions to fuzzy variables there are several methods. This allocation can be completed by intuition or by using some algorithms or logical line of actions.

Inference
The fuzzy value which is the output of the fuzzification is then passed on to the fuzzy system/fuzzy inference engine. This engine has a set of rules which explain what should be done based on the fuzzy value. For example, let's take the rule "If cloth is dirty, the detergent added is more ". This rule explains that when the cloth is dirty, more detergent should be added in order to clean it well.

Defuzzification
 When the process of the fuzzy inference engine is completed, the result is a fuzzy output. As per the above example, the result is adding more detergent. But with this output we don't know the exact amount of detergent to be added. So to get the exact value, the defuzzifier converts the fuzzy value into crisp value. This conversion is named defuzzification.

Usually the fuzzy control systems get multiple inputs which are then fuzzified individually and passed onto the Inference Engine. The inference engine consists several rules to decide the fuzzy output value. It combines the inputs with the help of fuzzy logical operators and then makes the decision based on the rules and the fuzzy output value is produced. The combining process is named Inference. In the defuzzification process for each and every fuzzy value, a crisp value is produced.

3.2 Neuro-fuzzy modelling approach

In building intelligent system, fuzzy logic and neural networks are natural tools. Neural networks are good for recognising patterns but poor at explaining the decision making process. Unlike neural networks, fuzzy logic systems are good at explaining their decisions. However, they are unable to automatically acquire the rules and membership functions. A combination of these two systems generates a powerful tool which overcomes the weaknesses.

A Neuro-fuzzy system is a neural network which is functionally equivalent to a fuzzy inference system. Without any prior knowledge of rules and membership function it can be trained to develop fuzzy rules and determine membership functions for the input and output variables of the system.

This modelling approach can be used for two purposes:

1) Providing a model that can predict the behaviour of the underlying system.
2) Controlling the system.

Adaptive Neuro-Fuzzy Inference System (ANFIS) which was proposed by Jang [1] in 1993 is one of the specific approaches of Neuro Fuzzy systems in which a fuzzy system is implemented in the framework of an adaptive network.

The structure of the ANFIS

It is similar to a multi-layer neural network with architecture of five layers. Neuro-fuzzy system contains an input layer (first layer) representing fuzzy membership functions, a second and third layers contain nodes that provide the antecedent parts in each rule. The fourth layer computes the first-order Takagi-Sugeno rule output for each fuzzy rule and the fifth output layer computes the weighted global output of the system.
The basic ANFIS architecture of the first-order Takagi Sugeno inference system has two inputs x and y and one output F, as shown in Fig. The circle nodes are fixed whilst square nodes need to train the parameters.
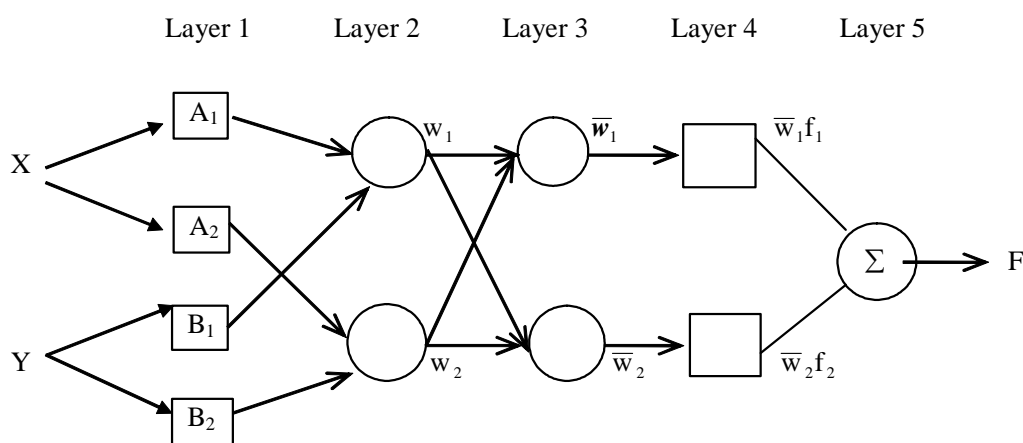

Figure 8: Typical fuzzy system An ANFIS architecture for a two rules Sugeno system

In figure 8, the two fuzzy if-then rules of Takagi and Sugeno's type are shown.

$$\text{Rule 1} \quad \text{IF x is } A_1 \text{ and y is } B_1 \text{ THEN } f_1 = p_1 x + q_1 y + r_1$$

$$\text{Rule 2} \quad \text{IF x is } A_2 \text{ and y is } B_2 \text{ THEN } f_2 = p_2 x + q_2 y + r_2$$

Layer 1

It is referred to as the fuzzification layer which is used to determine the membership grades. Every node i in this layer is a square node with a node function.

$$O_{1,i} = \mu_{A_i}(x) \quad for\ i = 1,2$$

$$O_{1,i} = \mu_{B_{i-2}}(y)\ for\ i = 3,4$$

Where x and y are input to node i and A_i and B_i are the fuzzy set associated with node function. $O_{1,i}$ is the membership function value of A_i and B_i which show the degree that x and y belong to A_i and B_i respectively. The membership function can be any continuous and piecewise differentiable function such as the bell shaped trapezium, triangular, gaussian etc. For example, the bell shaped membership function $\mu_{A_i}(x)$ with maximum equal to 1 and minimum equal to 0 is given as

$$\mu_{A_i}(x) = \frac{1}{1 + \left|\dfrac{x - c_i}{a_i}\right|^{2b_i}}$$

where $[a_i, b_i, c_i]$ are parameters.

Layer 2

Every node in this layer is fixed which multiplies the membership value from layer 1. For example, as the product given below.

$$O_{2,i} = w_i = \mu_{A_i}(x) \times \mu_{B_i}(y) \quad i = 1,2$$

The output of each node represents the firing strength of a fuzzy rule.

Layer 3

Layer 3 contains fixed nodes which calculate the ratio of the ith rule firing strength to the total of all firing strength ratio of the firing strengths of the rules normalised:

$$O_{3,i} = \overline{w_i} = \frac{w_i}{w_1 + w_2} \quad i = 1,2$$

Layer 4

The nodes in this layer are adaptive and perform the consequent part of the rules:

$$O_{4,i} = \overline{w_i} f_i = \overline{w_i}(p_i x + q_i y + r_i)$$

The parameters in this layer $[p, q_i, r_i]$ are to be determined and are referred to as the consequent parameters and $\overline{w_i}$ is the output from the previous layer.

Layer 5

The overall output is computed in this layer which involves a single node:

$$O_{5,i} = \sum_i \overline{w_i} f_i = \frac{\sum_i w_i f_i}{\sum_i w_i}$$

4. Automatic music genre classification model using fuzzy logic and neural network

We have implemented fuzzy neural techniques that can be used to classify a song or a short sound clip into its corresponding music genre. Our algorithms have two phases: (1) feature extraction technique and; (2) model implementations. In feature extraction, six features have been used. Namely, these are:

1) Short Time Energy: The energy of the signal in each analysis frame/window;

2) Spectral Centroid: The spectral centroid is center of gravity of the magnitude spectrum of the Fourier transform;

3) Zero-crossing: Mean of zero crossings across time frames in the texture window;

4) Spectral Flux: The spectral flux is defined as the squared difference between the normalized magnitudes of successive spectral distributions;

5) Spectral Rolloff: The spectral rolloff is defined as the frequency below 85% of the magnitude distribution.

Model results and validation

We have used five types of music, namely, blues, classical, country, disco and pop to examine the automatic music genre classification methods described above. We have used 125 songs as experimental data represented by the x-axis in Figure 9 for validation of our model. The y-axis represents the genres of the songs and for each genre there are 25 songs. The genres 1, 3, 5, 7 and 9 represents blues, classical, country, disco and pop, respectively. The model is used to predict the genres provided the songs. Figure 9 shows that the predictions (red plus) are in good agreement with the experimental data (blue star). Therefore, our model can be used to classify the genres of any song provided.
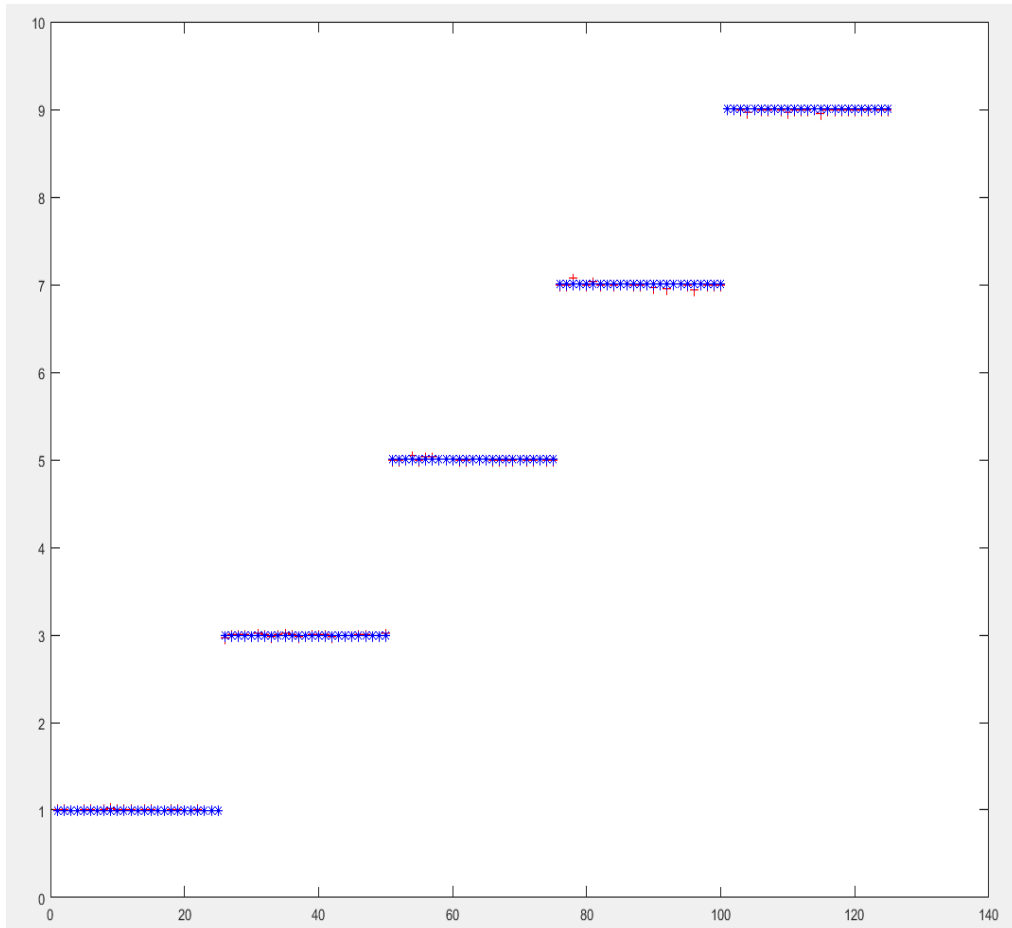
Figure 9: Comparison between model prediction (red plus) and experiemental data (blue star).

5. Mathematical model for predication of political events using top hits music

There is a correlation between the popular music prior to election and the outcome of the election. This indicates a dependency of the election results on the popular music. Therefore, a model has been developed using training data (*Appendix A*) to map the election results to the popular music. This has been done using neural and fuzzy network techniques. Firstly, data has been collected on the popular music one year prior to the election (see *Appendix B* for a list of songs) and also data has been collected on the election results (see *Appendix C* for the list).

Model results and validation

We have used 26 songs from the hit list to check our model. Figure 10 shows the prediction (red star) of the election results in comparison with the historical data (blue circle). In the y-axis, 1 represents the labour party and 0 represents the conservative party winning the election and the x-axis represents the hit songs. We see that the model predictions show good agreement with the historical data. Only a limited amount of data is available on the songs and more data would allow for more reliable prediction.
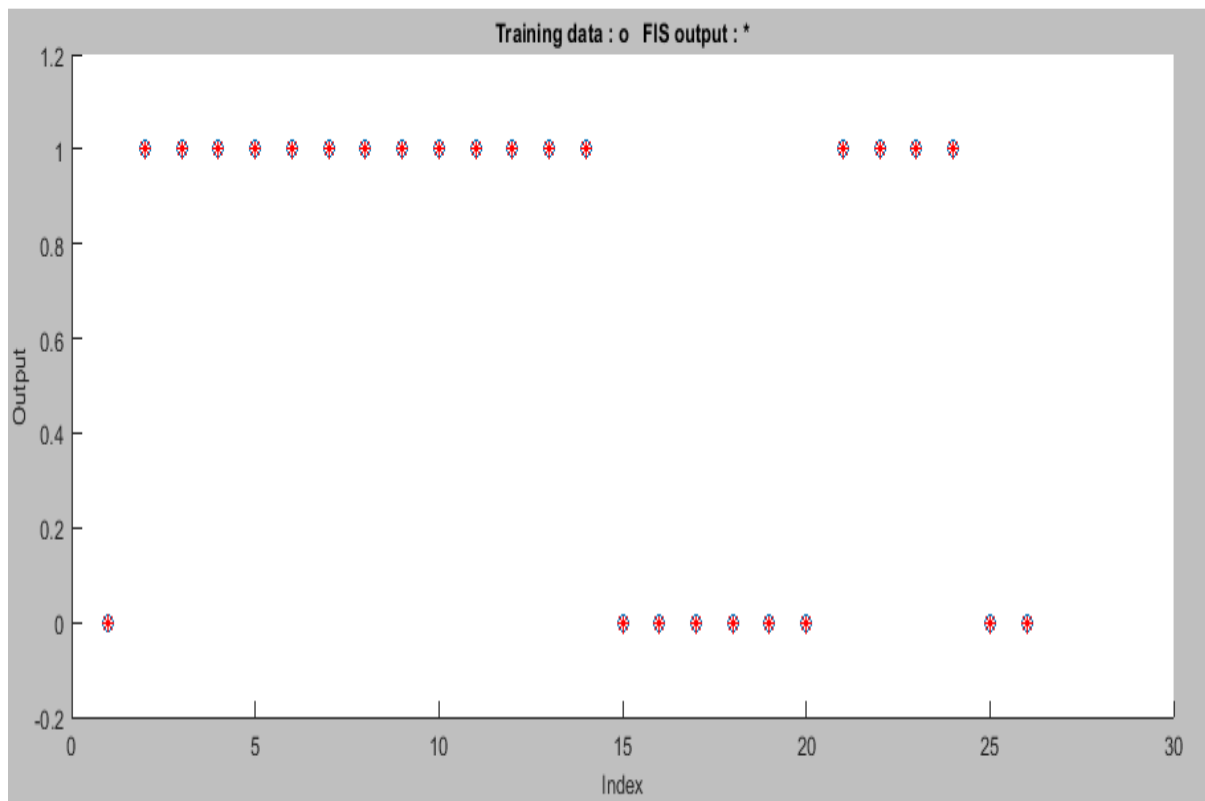
Figure 10: Comparison of the historical data (blue circle) and the model prediction (red star).

6. Conclusion and future work

Models have been developed for the automatic music classification and also political event prediction. The main objectives of the Proof of Concept are met. Future work includes making the model for the political event prediction more sophisticated by adapting other machine learning techniques and adding more data. This can then be used to make reliable predictions for future election results.

References

[1] Jang J.S.R. *ANFIS: adaptive-network-based fuzzy inference system*. IEEE Trans Systems Man Cybern. **23**(3): 665–685, 1993.

[2] Zadeh L. A. *Outline of a new approach to the analysis of complex systems and decision processes. IEEE Trans.* on Systems, Man, and Cybernetics *3*(1): 28-44, 1973.

[3] Denai M. A., F. Palis, and A. Zeghbib. *Modeling and control of non-linear systems using soft computing techniques*. Applied Soft Computing. **7**(3): 728 – 738, 2007.

Appendix (A)

Training data

Year	Std - Energy Entropy	Std - ZCR	std-SpectralRollOff	Std - Spectral Centroid	Std - Spectral Flux	Std - Energy	Party
2009	0.019	0.1799	0.0018	0.0121	2.051	1.329	C
2004	0.0213	0.2242	0.0019	0.0234	2.347	1.7277	L
2004	0.0227	0.2103	0.0017	0.0212	3.3013	1.9094	L
2004	0.0163	0.3196	0.0022	0.0167	2.2703	0.939	L
2004	0.0215	0.0563	0.0017	0.0104	1.9904	1.6226	L
2000	0.0121	0.3552	0.0022	0.0157	1.2425	0.5036	L
2000	0.0251	0.1543	0.0017	0.0224	2.5768	2.4328	L
2000	0.0178	0.0584	0.0017	0.0084	1.9915	1.1332	L
1996	0.0132	0.399	0.002	0.0135	1.7606	0.5938	L
1996	0.0156	0.2255	0.002	0.0155	1.3865	0.7983	L
1996	0.0278	0.2145	0.0021	0.024	1.6228	3.1674	L
1996	0.0188	0.0948	0.0017	0.0108	1.5663	1.1388	L
1996	0.0307	0.2284	0.0018	0.0222	1.9502	4.1917	L
1996	0.0238	0.1825	0.0018	0.0232	2.7153	2.0545	L
1991	0.0185	0.0523	0.0018	0.0088	1.7118	1.1822	C
1991	0.0205	0.25	0.0018	0.0122	1.1269	1.5556	C
1991	0.0117	0.1442	0.0017	0.0142	1.5424	0.4685	C
1986	0.0543	0.1468	0.0013	0.0171	2.4987	21.2149	C
1982	0.0136	0.1501	0.0018	0.0167	1.615	0.6481	C
1978	0.0253	0.2679	0.0021	0.0177	1.9821	2.4001	C
1973	0.0183	0.2571	0.0019	0.019	2.1738	1.2213	L
1973	0.0235	0.5986	0.0024	0.0273	1.686	2.454	L
1973	0.0222	0.1842	0.0016	0.0245	3.3922	1.8606	L
1973	0.0127	0.1256	0.0019	0.0124	1.394	0.5509	L
1969	0.0228	0.1416	0.0022	0.0109	1.4147	2.2558	C
1969	0.0223	0.3236	0.0018	0.0217	2.6842	2.0182	C

Table 1: Training data al data (C – Conservatory party) and the model prediction (L – Labour came to power).

1969

position	Artist	Title
01	Archies	Sugar Sugar
02	Beatles With Billy Preston	Get Back
03	The Rolling Stones	Honky Tonk Women
04	Peter Sarstedt	Where Do You Go To (My Lovely)
05	Jane Birkin & Serge Gainsbourg	Je T'Aime... Moi Non Plus
06	Marvin Gaye	I Heard It Through The Grapevine
07	Creedence Clearwater Revival	Bad Moon Rising
08	Fleetwood Mac	Albatross
09	Frank Sinatra	My Way
10	Bobbie Gentry	I'll Never Fall In Love Again
11	Dean Martin	Gentle On My Mind
12	Zager & Evans	In The Year 2525
13	Elvis Presley	In The Ghetto
14	Marmalade	Ob-La-Di Ob-La-Da
15	The Beatles	The Ballad Of John And Yoko
16	Tommy Roe	Dizzy
17	Robin Gibb	Saved By The Bell
18	Thunderclap Newman	Something In The Air
19	Mary Hopkin	Goodbye
20	Fleetwood Mac	Oh Well
21	Desmond Dekker & The Aces	The Israelites
22	Kenny Rogers & The First Edition	Ruby Don't Take Your Love To Town
23	Donald Peers	Please Don't Go
24	The Bee Gees	Don't Forget To Remember
25	Plastic Ono Band	Give Peace A Chance

1973

01	Dawn featuring Tony Orlando	Tie A Yellow Ribbon Round The Old Oak Tree
02	Peters & Lee	Welcome Home
03	The Sweet	Blockbuster
04	Simon Park Orchestra	Eye Level
05	Wizzard	See My Baby Jive
06	Gary Glitter	I Love You Love Me Love
07	Little Jimmy Osmond	Long Haired Lover From Liverpool
08	Gary Glitter	I'm The Leader Of The Gang (I Am)
09	Perry Como	And I Love You So
10	Slade	Cum On Feel The Noize
11	David Cassidy	Daydreamer / Puppy Song
12	Donny Osmond	The Twelfth Of Never
13	10cc	Rubber Bullets
14	Gilbert O'Sullivan	Get Down
15	Gary Glitter	Hello Hello I'm Back Again
16	Donny Osmond	Young Love
17	Al Martino	Spanish Eyes
18	The Carpenters	Yesterday Once More
19	Suzi Quatro	Can The Can
20	The Strawbs	Part Of The Union
21	Slade	Skweeze Me, Pleeze Me
22	Perry Como	For The Good Times
23	The Osmonds	Let Me In
24	Barry Blue	Dancing On A Saturday Night
25	Gary Glitter	Do You Wanna Touch Me (Oh Yeah)

1978

01	Boney M	Rivers Of Babylon / Brown Girl In The Ring
02	John Travolta & Olivia Newton-John	You're The One That I Want
03	John Travolta & Olivia Newton-John	Summer Nights
04	The Bee Gees	Night Fever
05	The Commodores	Three Times A Lady
06	Brian & Michael	Matchstalk Men And Matchstalk Cats And Dogs
07	Father Abraham & The Smurfs	The Smurf Song
08	Abba	Take A Chance On Me
09	Kate Bush	Wuthering Heights
10	The Boomtown Rats	Rat Trap
11	Wings	Mull Of Kintyre / Girl's School
12	10cc	Dreadlock Holiday
13	Brotherhood Of Man	Figaro
14	Blondie	Denis
15	Clout	Substitute
16	Darts	Come Back My Love
17	Gerry Rafferty	Baker Street
18	Boney M	Mary's Boy Child
19	Darts	The Boy From New York City
20	Althia & Donna	Uptown Top Ranking
21	Marshall Hain	Dancin' In The City
22	Rose Royce	Wishing On A Star
23	John Travolta	Sandy
24	Johnny Mathis & Deniece Williams	Too Much Too Little Too Late
25	Darts	It's Raining

1982

1	Dexy's Midnight Runners With The Emerald Express	Come On Eileen
02	Survivor	Eye Of The Tiger
03	Irene Cara	Fame
04	Tight Fit	The Lion Sleeps Tonight
05	Culture Club	Do You Really Want To Hurt Me?
06	Eddy Grant	I Don't Wanna Dance
07	Adam Ant	Goody Two Shoes
08	Goombay Dance Band	Seven Tears
09	Bucks Fizz	The Land Of Make Believe
10	Paul McCartney & Stevie Wonder	Ebony And Ivory
11	Musical Youth	Pass The Dutchie
12	Renee & Renato	Save Your Love
13	Kraftwerk	The Model / Computer Love
14	The Jam	A Town Called Malice / Precious
15	Shakin' Stevens	Oh Julie
16	Madness	House Of Fun
17	The Stranglers	Golden Brown
18	The Human League	Don't You Want Me
19	The Steve Miller Band	Abracadabra
20	Charlene	I've Never Been To Me
21	Toni Basil	Mickey
22	Yazoo	Only You
23	Tears For Fears	Mad World
24	Dionne Warwick	Heartbreaker
25	Yazoo	Don't Go

1986

01	The Communards	Don't Leave Me This Way
02	Diana Ross	Chain Reaction
03	Boris Gardiner	I Want To Wake Up With You
04	Billy Ocean	When The Going Gets Tough (The Tough Get Going)
05	Berlin	Take My Breath Away (Love Theme From 'Top Gun')
06	Chris De Burgh	The Lady In Red
07	Madonna	Papa Don't Preach
08	Doctor & The Medics	Spirit In The Sky
09	Sinitta	So Macho / Cruising
10	Falco	Rock Me Amadeus
11	Cliff Richard & The Young Ones	Living Doll
12	Europe	The Final Countdown
13	George Michael	A Different Corner
14	Nick Berry	Every Loser Wins
15	A-ha	The Sun Always Shines On TV
16	Jermaine Stewart	We Don't Have To Take Our Clothes Off
17	Wham!	The Edge Of Heaven
18	Spitting Image	The Chicken Song
19	Madonna	True Blue
20	Patti LaBelle & Michael McDonald	On My Own
21	Nu Shooz	I Can't Wait
22	The Bangles	Walk Like An Egyptian
23	Kim Wilde	You Keep Me Hangin' On
24	Peter Gabriel	Sledgehammer
25	Five Star	Rain Or Shine

1991

01	Bryan Adams	(Everything I Do) I Do It For You
02	Cher	The Shoop Shoop Song (It's In His Kiss)
03	Chesney Hawkes	The One And Only
04	Right Said Fred	I'm Too Sexy
05	The Simpsons	Do The Bartman
06	Color Me Badd	I Wanna Sex You Up
07	Jason Donovan	Any Dream Will Do
08	Vic Reeves & The Wonder Stuff	Dizzy
09	The KLF featuring The Children Of The Revolution	3AM Eternal
10	2 Unlimited	Get Ready For This
11	Oceanic	Insanity
12	Salt-N-Pepa	Let's Talk About Sex
13	James	Sit Down
14	Extreme	More Than Words
15	Michael Jackson	Black Or White
16	The Clash	Should I Stay Or Should I Go
17	Amy Grant	Baby Baby
18	Enigma	Sadness Part 1
19	Heavy D & The Boyz	Now That We've Found Love
20	Nomad featuring MC Mikee Freedom	(I Wanna Give You) Devotion
21	George Michael & Elton John	Don't Let The Sun Go Down On Me
22	The Scorpions	Wind Of Change
23	Beverley Craven	Promise Me
24	The KLF featuring The Children Of The Revolution	Last Train To Trancentral
25	Kenny Thomas	Thinking About Your Love

1996

01	The Spice Girls	Wannabe
02	Fugees	Killing Me Softly
03	Mark Morrison	Return Of The Mack
04	Gina G	Ooh Aah... Just A Little Bit
05	Robert Miles	Children
06	Peter Andre featuring Bubbler Ranx	Mysterious Girl
07	Baddiel & Skinner and The Lightning Seeds	Three Lions
08	Babylon Zoo	Spaceman
09	Toni Braxton	Un-Break My Heart
10	The Spice Girls	Say You'll Be There
11	George Michael	Fastlove
12	3T	Anything
13	Deep Blue Something	Breakfast At Tiffany's
14	The Prodigy	Firestarter
15	Los Del Rio	Macarena
16	Oasis	Don't Look Back In Anger
17	Fugees	Ready Or Not
18	The Prodigy	Breathe
19	Take That	How Deep Is Your Love
20	Michael Jackson	Earth Song
21	Underworld	Born Slippy
22	Celine Dion	Because You Loved Me
23	Mark Snow	The X-Files
24	Tony Rich Project	Nobody Knows
25	Gabrielle	Give Me A Little More Time

2000

	01	Baha Men	Who Let The Dogs Out
02		Sonique	It Feels So Good
03		Eminem	The Real Slim Shady
04		Gabrielle	Rise
05		All Saints	Pure Shores
06		Fragma	Toca's Miracle
07		S Club 7	Reach
08		Robbie Williams	Rock DJ
09		Westlife	I Have A Dream / Seasons In The Sun
10		Craig David	Fill Me In
11		Modjo	Lady (Hear Me Tonight)
12		Spiller	Groovejet (If This Ain't Love)
13		Ronan Keating	Life Is A Rollercoaster
14		Britney Spears	Oops!... I Did It Again
15		Madonna	Music
16		The Bloodhound Gang	The Bad Touch
17		Craig David	7 Days
18		Mariah Carey & Westlife	Against All Odds
19		Darude	Sandstorm
20		Artful Dodger featuring Craig David	Re-Rewind The Crowd Say Bo Selecta
21		Melanie C featuring Lisa 'Left Eye' Lopes	Never Be The Same Again
22		Britney Spears	Born To Make You Happy
23		Bomfunk MC's	Freestyler
24		Madonna	American Pie
25		The Corrs	Breathless

2004

01	Eamon	F**k It (I Don't Want You Back)
02	Eric Prydz	Call On Me
03	Anastacia	Left Outside Alone
04	DJ Casper	Cha Cha Slide
05	Usher featuring Lil' Jon & Ludacris	Yeah!
06	Frankee	FURB (F U Right Back)
07	Kelis	Milkshake
08	Mario Winans featuring Enya & P Diddy	I Don't Wanna Know
09	3 Of A Kind	Baby Cakes
10	Michelle McManus	All This Time
11	Britney Spears	Everytime
12	Michael Andrews featuring Gary Jules	Mad World
13	Destiny's Child	Lose My Breath
14	The Shapeshifters	Lola's Theme
15	Outkast	Hey Ya!
16	LMC vs U2	Take Me To The Clouds Above
17	O-Zone	Dragostea Din Tei
18	The Streets	Dry Your Eyes
19	Busted	Thunderbirds / 3AM
20	Usher	Burn
21	Britney Spears	Toxic
22	Natasha Bedingfield	These Words
23	Ozzy & Kelly Osbourne	Changes
24	Boogie Pimps	Somebody To Love
25	Kelis	Trick Me

01	LADY GAGA	POKER FACE
02	BLACK EYED PEAS	I GOTTA FEELING
03	LA ROUX	IN FOR THE KILL
04	LADY GAGA	JUST DANCE
05	KINGS OF LEON	SEX ON FIRE
06	KINGS OF LEON	USE SOMEBODY
07	BLACK EYED PEAS	BOOM BOOM POW
08	JAMES MORRISON / NELLY FURTADO	BROKEN STRINGS
09	DAVID GUETTA FT AKON	SEXY CHICK
10	JAY-Z FT ALICIA KEYS	EMPIRE STATE OF MIND
11	TINCHY STRYDER FT N-DUBZ	NUMBER 1
12	LADY GAGA	PAPARAZZI
13	LILY ALLEN	THE FEAR
14	AR RAHMAN FT PUSSYCAT DOLLS	JAI HO (YOU ARE MY DESTINY)
15	BEYONCE	HALO
16	LILY ALLEN	NOT FAIR
17	DANIEL MERRIWEATHER	RED
18	DAVID GUETTA FT KELLY ROWLAND	WHEN LOVE TAKES OVER
19	BEYONCE	SINGLE LADIES (PUT A RING ON IT)
20	BEYONCE	SWEET DREAMS
21	KERI HILSON / KANYE WEST / NE-YO	KNOCK YOU DOWN
22	LA ROUX	BULLETPROOF
23	BLACK EYED PEAS	MEET ME HALFWAY
24	DIZZEE RASCAL / VAN HELDEN	BONKERS
25	TAYLOR SWIFT	LOVE STORY

Appendix (C)

1. 8 June 1970 Conservatives win the general election, with Edward Heath as prime minister
2. 28 February 1974 Election ends in a 'hung parliament' with Harold Wilson as prime minister
3. 10 October 1974 Labour wins a tiny majority in the election with Harold Wilson as prime minister
4. 16 March 1976 Prime Minister Harold Wilson resigns and is replaced by James Callaghan
5. 3 May 1979 Conservative Margaret Thatcher becomes Britain's first female prime minister
6. 10 June 1983 Conservative Prime Minister Margaret Thatcher is re-elected by a landslide
7. 11 June 1987 Conservative Prime Minister Margaret Thatcher wins a third term
8. 22 November 1990 Margaret Thatcher resigns and John Major becomes prime minister
9. 9 April 1992 Conservatives win the general election, returning John Major as prime minister
10. 1 May 1997 Labour wins the general election, with Tony Blair as prime minister
11. 7 June 2001 Labour wins the general election, with Tony Blair returned as prime minister
12. 5 May 2005 Labour wins a third consecutive term with Tony Blair as prime minister
13. 2007 June - Gordon Brown succeeds Tony Blair as premier.
14. 2010 May - General election: Conservative Party wins most seats but fails to gain an absolute majority. Conservative leader David Cameron becomes PM at the head of a coalition with the third-placed Liberal Democrats.