Applying Computerized Digitizing Technique to Explore the POP Album Cover Historical Reflections

Li-Min Chen, Lung-Hsing Kuo, Hung-Jen Yang

Abstract— The purpose of this study was to demonstrate the application of computerized digitizing process on exploring the historical reflection of the old pop album cover. Through digitizing technique, the characteristics of old pictures could be measured. Based on the color attributes of pop album cover, a diachronic study was conducted. It was argued that the denotation is significant related to the color attributes and the connotation is not necessary significant related to the color attributes. The population of this study was those pop albums published from 1970 to 2000. The sampled representative pop album covers were collected and scanned into digital files for both color attribute analysis and content analysis. The denotation and color attributes of each sampled album cover were also identified for statistical test. A logit regression was used to predict denotation of pop album cover from mean value of color channel Red, Green, and Blue. The C5.0 model was used to build a rule set and a decision tree for further illustrate the relation between color attribute and denotation.

Keywords—Digitizing, POP album cover, denotation

I. INTRODUCTION

Digitizing technology enables graphic communication expanding the ability of dealing with old pictures in recording, transferring, and processing traditional information format, such as pictures, and paper printings. With the digitizing technology, it is possible to explore information behind the surface or outlook of images.

The advertising business already had become part of the society lifestyle. It can be concluded that in the modern society, advertisement always shows the messages and the ideology of what it told to the society. Advertising then, is used as the mass media communication that has its symbols, meaning and messages to the readers. The album cover also is a form of advertisement. It is not only as the promotion of one product but also has become the idea of a system with its own value. One pop album cover represents some messages for the readers, in which the message is created by using signs and codes and for purpose that the readers can understand the messages that are sent. People use technology to support information exchange. Visualization enhances communication functions. In this mobile technology world where all things communicate, it is important that we determine what precisely we are trying to say. Packaging pop album with a cover is not only providing protection to the black vinyl music disc, but also the information related to that album all about. By printing sign on the cover, the visual communication could be established upon the text and image around the cover. A public publication, such as a pop album cover, should be design and layout according the designer's idea and the public perception[1].

Codes are symbols with systematic meaning and signs are important elements in languages and communication. By Barthes' definition, a sign is the combination of a signifier and signified. In this perspective, a sign cannot stand alone[2]. Digitizing technology would play a role in exploring the connections behind the outlooks.

There is a need to express the function of computerized digitizing process on exploring characteristics behind images.

II. CONCEPTUAL FRAMEWORK

The term digitizing is often used when diverse forms of information, such as text, sound, image or voice, are converted into a single binary code. Digital information exists as one of two digits, either 0 or 1. These are known as bits (a contraction of binary digits) and the sequences of 0s and 1s that constitute information are called bytes[3].

Digital signals are discrete in both of those respects – generally a finite sequence of integers – therefore a digitization can, in practical terms, only ever be an approximation of the signal it represents. On the other hand, since there are only two status, it is easy to recover whenever found the transmission failure.

Digitization occurs in two parts:

● Discretion process

The reading of an analog signal A, and, at regular time intervals (frequency), sampling the value of the signal at the point. Each such reading is called a sample and may be considered to have infinite precision at this stage;

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● Quantization

Samples are rounded to a fixed set of numbers (such as integers), a process known as quantization.

In general, these can occur at the same time, though they are conceptually distinct.

A series of digital integers can be transformed into an analog output that approximates the original analog signal. Such a transformation is called a DA, digital to analog, conversion. The sampling rate and the number of bits used to represent the integers combine to determine how close such an approximation to the analog signal a digitization will be.

This shift to digitization in the contemporary media world has created implications for traditional mass media products, however these "limitations are still very unclear"[4] The more technology advances, the more converged the realm of mass media will become with less need for traditional communication technologies. For example, the Internet has transformed many communication norms, creating more efficiency for not only individuals, but also for businesses. However, McQuail suggested that traditional media have also benefited greatly from new media, allowing more effective and efficient resources available[4].

Digital preservation in its most basic form is a series of activities maintaining access to digital materials over time[5]. Digitization in this sense is a means of creating digital surrogates of analog materials such as books, newspapers, microfilm and videotapes. Digitization can provide a means of preserving the content of the materials by creating an accessible facsimile of the object in order to put less strain on already fragile originals. For sounds, digitization of legacy analogue recordings is essential insurance against technological obsolescence[6].

Based upon the semiotics theories, the research foundations would be constructed. With the gradual opening up of Taiwan's political and economic stability, the changing was mainly between 1980 and 1992. Especially in 1987, martial law before and after the performance style of album covers have a very obvious change in Taiwan's pop music on album covers. Several focuses were founded, such as "how to explore their roots", "returning" as well as the mirror image of the role of self-identity. The formation of "subjectivity", and the integration with the International Federation of Phonographic Industry as a post-modern brewing out of graphic design clues, it also illustrates that pop music album cover design in the 1980s was a prelude to open a turning point in post-modern for the 1990s.

In this study, the denotation of album cover would be analyzed by using computer screen. The color system would be used is RGB color system. A model development could further explore relations among research variables [7].
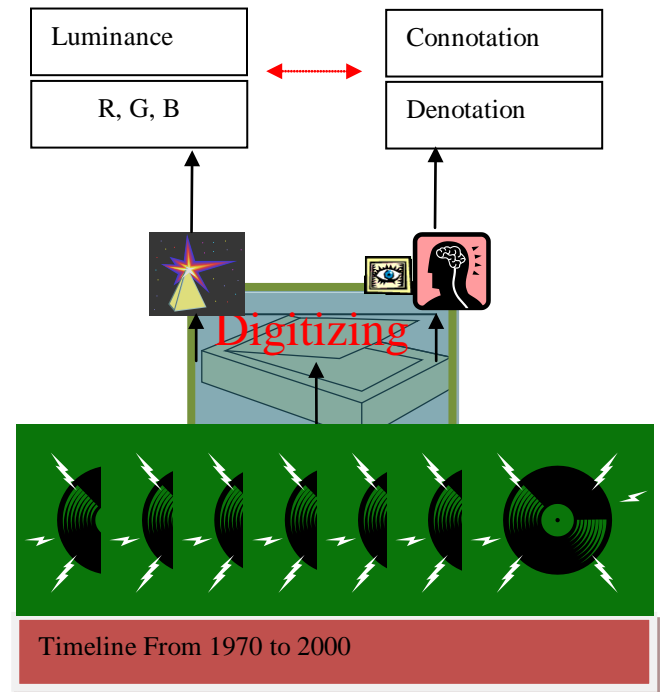

Figure 1 Concepts of Diachronic Study of Pop Album Cover and Color Attribute

III. METHODOLOGY

The development of both popular music and recording media are in parallel. Through the records publishing, pop music could be circulated in the general public. For this reason, this study assumes that the social phenomenon reflexes to music literature and art as well as the design of album cover. The digitizing technique could be used to reveal the relationship between them.

The albums cover is design as a carrier to load pop music upon popular music culture. It was hoped that the design of album cover could be applied to explore the contrast historical backgrounds and to distinguish the relationship between design and color attributes.

A. *Research* Questions

The purpose of this study was to demonstrate applying digitizing technique to identify the relation between the denotation of a pop album cover and its color attributes. It was hypnotized that there existed significant relation between denotation and color attributes.

B. *Sampling*

It is important to know what how many data is good enough for reach research requirement.[5] For fulfilling the goal of this study, the time period would be those years from 1970 till 2000. Although there were vast numbers of pop music album in Taiwan during research targeted time, the sampling procedure would follow "Taiwan's pop music, one hundred best album," and "Past Golden Melody Award for best album." to collect data for analysis. Based on these two awards, each year select a representative album.

The aim was to choose representative design of album cover for each year.

C. *Hypothesis and Models*

Color attributes considered were RGB color channel, R channel, G channel, B channel, and luminosity channel. The mean, standard deviation, and median values of each attribute were used for conducting statistical analysis.

1) *Research Hypothesis*

For identifying the proposed relationship, several hypotheses were claimed for empirical data evaluation.
- H01: There is no significant relationship between the chosen color channels of distribution with effectiveness of logistics and denotation of pop music cover
- H02: There exists no C5.0 model that could predict denotation of pop album covers from their color attributes.

2) *Statistic models*

For fulfilling the research purposes, two classification models were applied to test the research hypotheses. The first model used was the C5.0 node.

The C5.0 node builds either a decision tree or a rule set. The model works by splitting the sample based on the field that provides the maximum information gain at each level. The target field must be categorical.

This node uses the C5.0 algorithm to build either a decision tree or a rule set. A C5.0 model works by splitting the sample based on the field that provides the maximum information gain. Each subsample defined by the first split is then split again, usually based on a different field, and the process repeats until the subsamples cannot be split any further. Finally, the lowest-level splits are reexamined, and those that do not contribute significantly to the value of the model are removed or pruned.

The C5.0 node can predict only a categorical target. C5.0 can produce two kinds of models. A decision tree is a straightforward description of the splits found by the algorithm. Each terminal (or "leaf") node describes a particular subset of the training data, and each case in the training data belongs to exactly one terminal node in the tree. In other words, exactly one prediction is possible for any particular data record presented to a decision tree.

In contrast, a rule set is a set of rules that tries to make predictions for individual records. Rule sets are derived from decision trees and, in a way, represent a simplified or distilled version of the information found in the decision tree. Rule sets can often retain most of the important information from a full decision tree but with a less complex model. Because of the way rule sets work, they do not have the same properties as decision trees. The most important difference is that with a rule set, more than one rule may apply for any particular record, or no rules at all may apply. If multiple rules apply, each rule gets a weighted "vote" based on the confidence associated with that rule, and the final prediction is decided by combining the weighted votes of all of the rules that apply to the record in question. If no rule applies, a default prediction is assigned to the record.

Logistic regression is a statistical technique for classifying records based on values of input fields. It is analogous to linear regression but takes a categorical target field instead of a numeric range. Logistic regression, also known as nominal regression, is a statistical technique for classifying records based on values of input fields. It is analogous to linear regression but takes a categorical target field instead of a numeric one. Both binomial models (for targets with two discrete categories) and multinomial models (for targets with more than two categories) are supported.

Logistic regression works by building a set of equations that relate the input field values to the probabilities associated with each of the output field categories. Once the model is generated, it can be used to estimate probabilities for new data. For each record, a probability of membership is computed for each possible output category. The target category with the highest probability is assigned as the predicted output value for that record.

D. *Content Analysis and Coding System*

In this study, content analysis was conducted according to following steps.
1. Theory and rationale.
2. Conceptualization decisions
3. Operational measures
4. Coding schemes
5. Sampling
6. Coding

Upon reviewing literature, the denotation codes were claimed as following:
1. Commercial Popular
2. Super-reality of music world
3. Reality and voice of the Social Movement
4. Taiwan special – Corner Music

5. Taiwan Nationalism Folk Song

6. Chinese Folk Song

7. Campus Folk Song

8. Fresh-new Folk Song, post-campus folk song

9. Young rebellious "new breed"

10. Confinement after the liberation and freedom

11. Nostalgic and retro post-modern

12. Commercial Forms of Local Popular

IV. FINDINGS

Based upon the research methodology, findings of this study would be illustrated in the followings.

A. Sampled Pop Album Covers

The aim was to choose representative design of album cover for each year. The sampling procedure followed "Taiwan's pop music, one hundred best album," and "Past Golden Melody Award for best album." to collect data for analysis. Based on these two awards, each year select one representative album.

B. Denotation of sampled album cover

In the early 1980s, album covers are still continued the campus folk music style, keep fresh, clean, simple layout in 1970s. In the Table 1, Mr. Hou presented his album "Descendants of the Dragon" with the calligraphy of running script font and picture wearing traditional long robe and holding a classical reed bamboo pipe wind instrument instruments. The background of the cover is a traditional architecture dragon column and   traditional ink painting landscape of the rising sun, symbolizing the combination of explicit and stressed that China's modern simplicity inherent in the traditional elements of formal design.

It was intended to create the international identity of the Republic of China at that time on the "legitimacy" and "legitimacy". It also reflected the no formal diplomatic relation between Taiwan and the United States. The cover was also intended to echo to the highlighting of the legal status of the Republic of China in the United Nations before 1978. Because of the enthusiastic response to the publishing of the "Descendants of the Dragon", the commercial folk music continued to extend into the early 1980s. It also provided a vent for the pressure of the international isolation in the martial law era and appeases the tense atmospheres during the late 1970s and the early 1980s.

Table 1 Sampled Album Covers from 1980 to 1984

Year	Album Cover
1980	
1981	
1982	
1983	
1984	

In 1981, the design of Sylvia Chang's "childhood" album cover presented in a way of using illustrations. By drawing a picture of Sylvia with her childhood memories, this album represents the singer's imagination and memories of childhood. In the font used on the application, it used particularly the emotional handwriting rather the rational printing font. In fact, album cover design with illustration style had been applied at early folk songs period.

Table 2 Sampled Album Covers from 1985 to 1989

Year	Cover
1985	
1986	
1987	
1988	
1989	

Table 3 Sampled Album Covers from 1990 to 2000

Year	Cover
1990	
1991	
1992	
1996	
1997	
1998	
1999	
2000	

In table 2, album covers of year 1980, 1981, 1982, 1983, and 1984 were displayed. In Table 3, album covers of year 1985, 1986, 1987, 1988, and 1989 were also displayed. In Table 4, album covers of year 1990, 1991, and 1992 were included.

With a children looking like Sylvia Chang holding a picture of a now Sylvia Chang in the hands, the "childhood" album

presented a kind of design thinking than reality. The background of gold leaf connected both the past and the present era. The conceptual album in such a form as the starting point is a unique example in the year. The included songs were easy to sing and not tend to be abstruse and convoluted for the highbrow.

Su' album, "the same moonlight" did not show "Moonlight" on the cover. The screen is only a young rebellious close-up side face. With Su's unruly temperament coupled with a short hair and the black and white combination, it did show a kind of gender unrecognizing visual effects. This made "the same moonlight" becoming much more distinctive, which was representative works in year 1983.

In Table 3., Zongsheng Lee "Life in the Wizard," 1986 show a rope tied to the mailing package with the title of "Mr. Lee Zongsheng revenue". While the sender is also the receiver Zongsheng Lee, the wrinkling of the leather with Lee's picture. The leather with a few holes on seems to imply that leaking some information.

It is appropriate to illustrate mirror effect of this album cover form Lacan's mirror theory. It did show how "original I" "selfhood" and "superego" could be integrated on an album covers.

While watching the "subjectivity" is produced by the autonomy of the viewer, but the concept of psychoanalysis is the interpretation of visual images of the face, especially the impact of the viewer, through a specific interpretation of the image articulation or re-interpretation of focused concept.

C. Color attributes of album covers

In Table 5, the RGB color distribution histogram of year 1980, 1981, 1982, 1983 and 1984 album covers were presented. The horizontal value is the level and the vertical value is the count.

In Table 6, the RGB color distribution histogram of year 1985, 1986, 1987, 1988, and 1989 album covers were presented.

For further analyzing purpose, the Mean, Std. Deviation, and median of album cover luminance were measured and listed in Table 7. The Mean, Std. Deviation, and median of album cover color channel were measured and listed in Table 8. The Mean, Std. Deviation, and median of album cover R channel were measured and listed in Table 8. The Mean, Std. Deviation, and median of album cover G channel were measured and listed in Table 9. The Mean, Std. Deviation, and median of album cover B channel were measured and listed in Table 10.

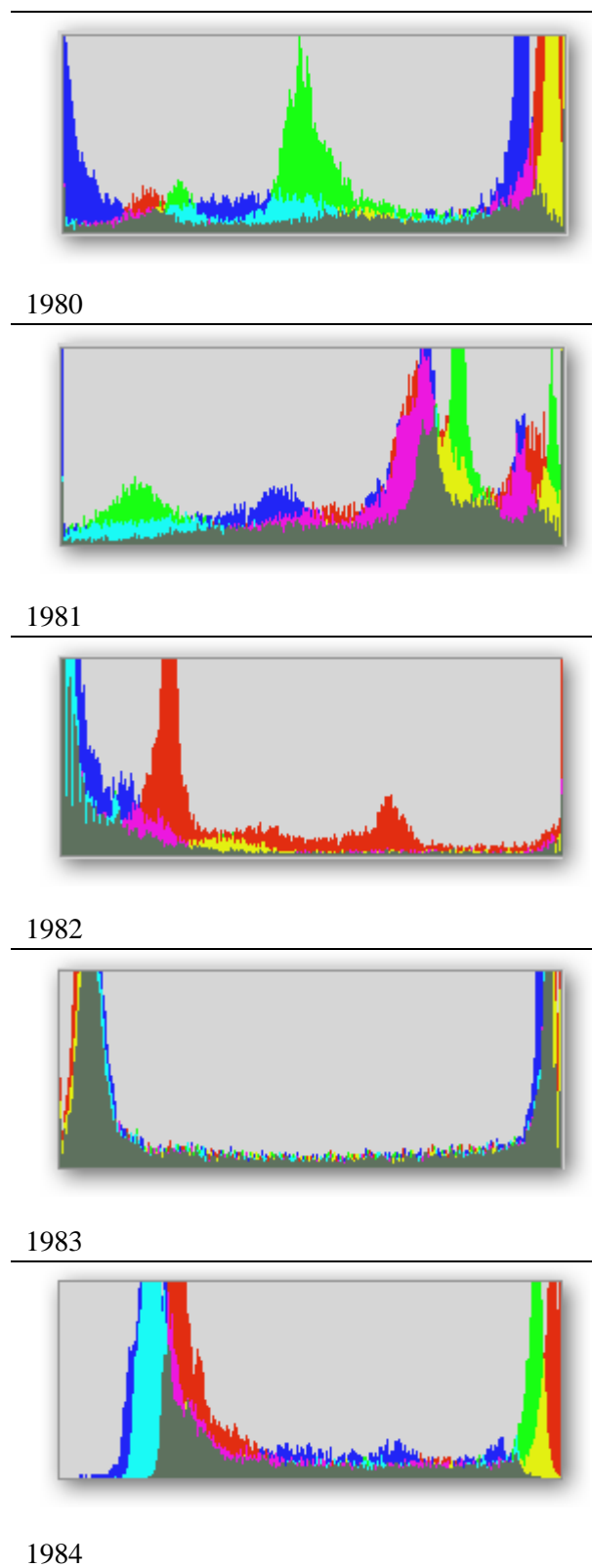Table 4 RGB Color Distribution Histogram of Album Covers from year 1980 to 1984

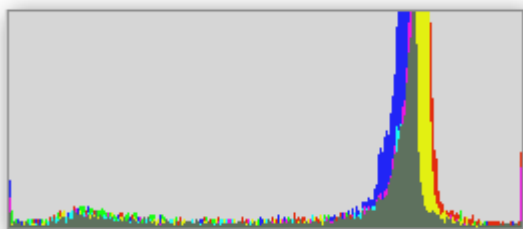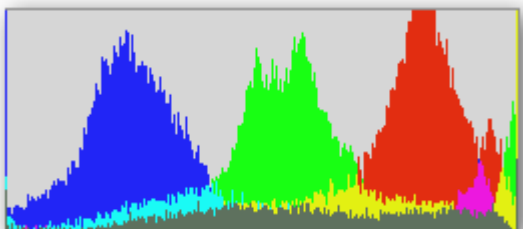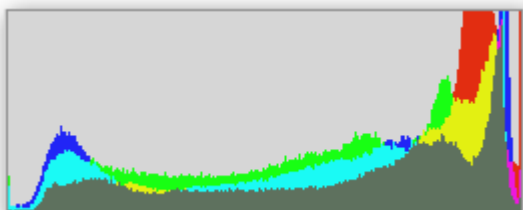
1980

1981

1982

1983

1984

Table 5 RGB Color Distribution Histogram of Album Covers
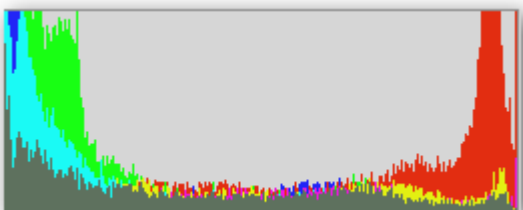from year 1985 to 1989

1985

1986

1987

1988

1989

In Table 6, the highest mean value is 191.97 and the lowed is 33.2. The highest standard deviation value is 107.46 of year 1983. The lowest standard deviation value is 39.13 of year 1985.

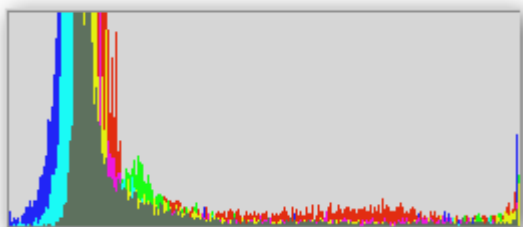Table 6 RGB Color Distribution Histogram of Album Covers
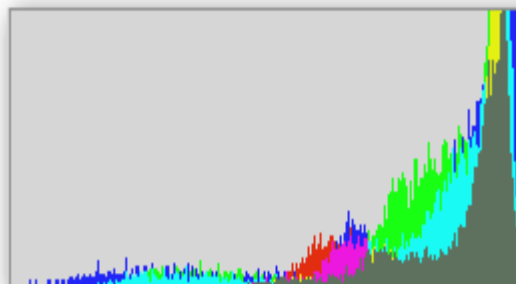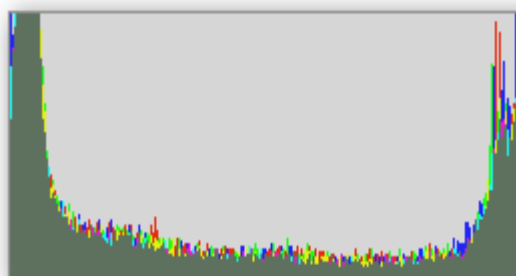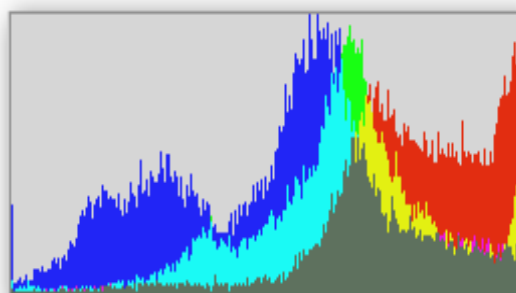from year 1990 to 1992

1990

1991

1992

In Table 7, the highest mean value is 190.93 and the lowed is 33.25. The highest standard deviation value is 107.08 of year 1983. The lowest standard deviation value is 39.33 of year 1985.

Table 7 Mean, Std. Deviation, and median of album cover luminance from 1980 to 1992

Year	Mean	Std. Dev.	Median
1980	177.02	66.58	165
1981	167.36	63.37	189
1982	33.2	49.74	17
1983	125	107.46	94
1984	114.02	77.2	68
1985	191.97	39.13	204
1986	154.73	49.4	154
1987	166.15	70.80	188
1988	91.18	61.85	84
1989	56.22	52.91	35
1990	219.96	33.58	234
1991	92.99	97.35	40
1992	172.25	44.91	173

Table 9 Mean, Std. Deviation, and median of album cover R channel from 1980 to 1992

Year	Mean	Std. Dev.	Median
1980	210.65	69.99	244
1981	181.69	53.8	186
1982	67.51	70.38	53
1983	124.38	108.14	92
1984	128.73	79.03	84
1985	193.15	38.64	204
1986	191.94	47.29	205
1987	183.71	68.73	216
1988	161.35	89.86	202
1989	69.28	61.54	42
1990	222.25	32.03	238
1991	94.04	97.49	43
1992	199.55	43.84	203

In Table 8, the highest mean value is 210.65 and the lowed is 67.51. The highest standard deviation value is 108.14 of year 1983. The lowest standard deviation value is 38.64 of year 1985.

In Table 10, the highest mean value is 187.43 and the lowed is 19.87. The highest standard deviation value is 105.74 of year 1983. The lowest standard deviation value is 38.59 of year 1985.

Table 8 Mean, Std. Deviation, and median of album cover colors channel from 1980 to 1992

Year	Mean	Std. Dev.	Median
1980	168.51	87.7	216
1981	166.37	66.27	184
1982	35.25	60.06	5
1983	124.96	107.08	95
1984	108.33	75.52	66
1985	190.93	39.33	202
1986	143.65	68.39	146
1987	166.49	73.79	191
1988	91.41	91.81	43
1989	55.69	55.17	36
1990	221.08	39.32	237
1991	92.28	97.4	39
1992	166	57.14	171

In Table 9, the highest mean value is 182.22 and the lowed is 18.27. The highest standard deviation value is 107.36 of year 1983. The lowest standard deviation value is 40.47 of year 1985.

Table 10 Mean, Std. Deviation, and median of album cover G channel

G			
Year	Mean	Std. Dev.	Median
1980	169.56	72.4	156
1981	162.42	74.4	192
1982	18.27	46.71	1
1983	125.37	107.36	95
1984	112.21	81.18	63
1985	192.22	40.47	205
1986	147.82	52.21	144
1987	159.02	72.09	177
1988	63.46	70.71	31
1989	51.49	51.76	33
1990	218.26	38.75	233
1991	93.04	97.3	41
1992	165.93	48.04	168

In Table 11, the highest mean value is 192.22 and the lowed is 18.27. The highest standard deviation value is 107.36 of year 1983. The lowest standard deviation value is 338.75 of year 1990.

Table 11 Mean, Std. Deviation, and median of album cover B channel from 1980 to 1992

Year	B		
	Mean	Std. Dev.	Median
1980	125.33	96.4	123
1981	154.98	66.06	176
1982	19.98	46.09	3
1983	125.13	105.74	96
1984	84.03	57.02	55
1985	187.43	38.59	199
1986	91.19	62.98	71
1987	156.75	77.25	177
1988	49.42	69.11	13
1989	46.29	48.72	30
1990	222.74	45.81	241
1991	89.76	97.36	34
1992	132.52	57.6	143

In Table 12, the highest mean value is 187.43 and the lowed is 19.98. The highest standard deviation value is 105.74 of year 1983. The lowest standard deviation value is 38.59 of year 1985.

Table 12 Model Fitting Information

Model Fitting Information				
	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	207.501			
Final	95.595	111.906	44	.000

D. Classification model

For verifying the model for predicting denotation from color attributes, the logistic model was reported in the following table.

Table 13 Case Processing Summary

		N	Marginal Percentage
Denotation	Commercial Popular	6	14.0%
	Super-reality of music world	3	7.0%
	Reality and voice of the Social Movement	4	9.3%
	Taiwan special – Corner Music	3	7.0%
	Taiwan Nationalism Folk Song	2	4.7%
	Chinese Folk Song	3	7.0%
	Campus Folk Song	6	14.0%
	Fresh-new Folk Song, post-campus folk song	2	4.7%
	Young rebellious "new breed"	5	11.6%
	Confinement after the liberation and freedom	4	9.3%
	Nostalgic and retro post-modern	3	7.0%
	Commercial Forms of Local Popular	2	4.7%
Valid		43	100.0%
Missing		0	
Total		43	
Subpopulation		43(a)	
a. The dependent variable has only one value observed in 43 (100.0%) subpopulations.			
Pseudo R-Square			
Cox and Snell	.926		
Nagelkerke	.933		
McFadden	.539		

The target was denotation. The inputs were mean values of R channel, G channel, and B channel mean. The algorithm applied was Logistic regression with classification model type.

The model fitting information was listed in table 12. Since the significant level is less than 0.05, we could proceed as if the model is reasonable. According to the pseudo r-square, the denotations could be explained by the model at 92.6 percent. The equations for predicting denotations were listed in table 14.

Table 14 Rule set of the Logit model

| Equation	Mean
Equation For 1 (Base) Commercial Popular	+ 0.0000000000000000000
Equation For 2 Taiwan Nationalism Folk Song	0.1039 * B_mean + -0.3194 * G_mean + 0.2961 * L_mean + -0.1082 * R_mean + + 2.655
Equation For 3 Chinese Folk Song	-0.8229 * B_mean + 0.9812 * G_mean + 0.03612 * L_mean + -0.0328 * R_mean + + -30.53
Equation For 4 Campus Folk Song	-0.6639 * B_mean + 0.857 * G_mean + 0.03971 * L_mean + -0.1063 * R_mean + + -22.17
Equation For 5 Fresh-new Folk Song, post-campus folk song	-0.1936 * B_mean + -0.2109 * G_mean + 0.07822 * L_mean + 1.064 * R_mean + + -171.9
Equation For 6 Young rebellious "new breed"	0.05993 * B_mean + -0.332 * G_mean + 0.09208 * L_mean + 0.5685 * R_mean + + -83.18
Equation For 7 Confinement after the liberation and freedom	-0.01305 * B_mean + -0.4078 * G_mean + 0.08998 * L_mean + 0.8093 * R_mean + + -106.4
Equation For 8 Nostalgic and retro post-modern	3.695 * B_mean + -7.098 * G_mean + 2.151 * L_mean + 3.171 * R_mean + + -472.1
Equation For 9 Commercial Forms of Local Popular	0.1247 * B_mean + -0.2774 * G_mean + 0.229 * L_mean + 0.1186 * R_mean + + -36.7
Equation For 10 Super-reality of music world	1.694 * B_mean + -2.086 * G_mean + 0.09586 * L_mean + 1.07 * R_mean + + -179.9
Equation For 11 Reality and voice of the Social Movement	-1.319 * B_mean + 1.63 * G_mean + 0.007726 * L_mean + -0.07378 * R_mean + + -52.07
Equation For 12 Taiwan special – Corner Music	0.09518 * B_mean + -0.07421 * G_mean + 0.2798 * L_mean + -0.04723 * R_mean + + -50.15
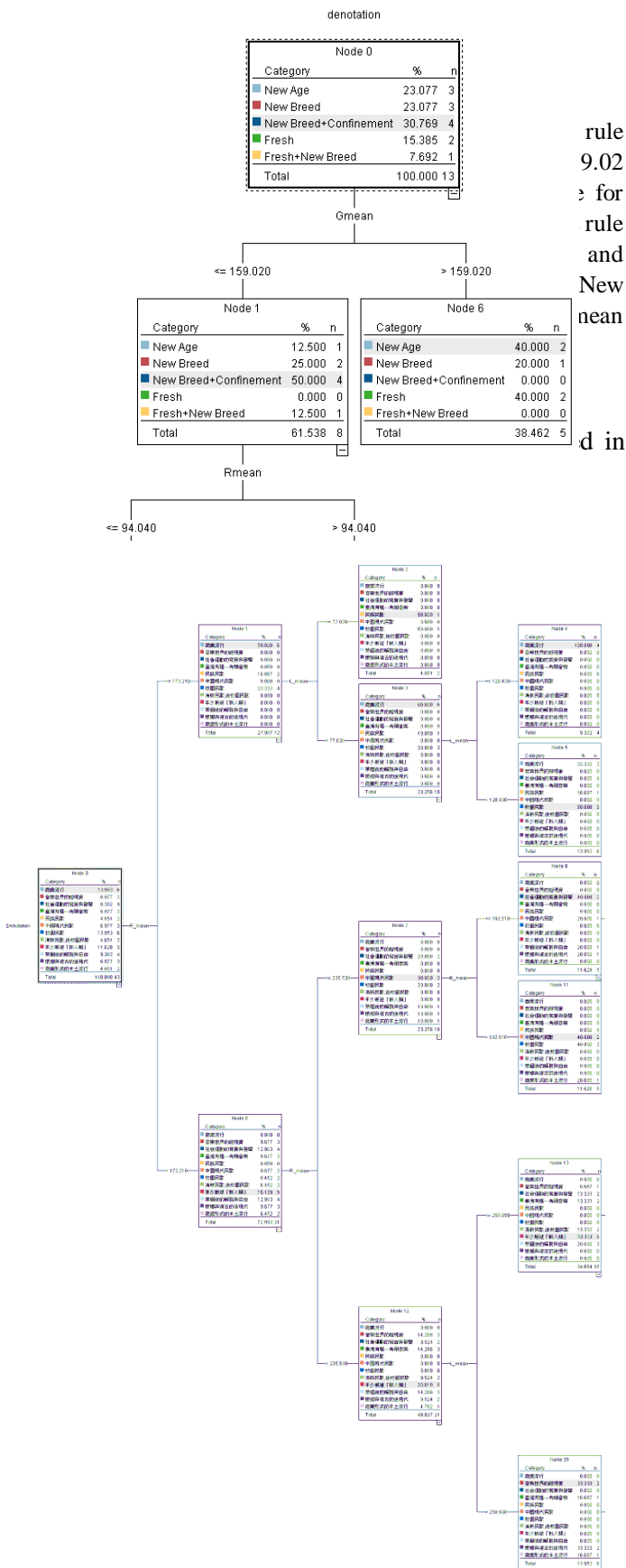
Figure 2 Decision tree of denotation by Bmean, Gmean, Lmean and Rmean

V. CONCLUSION

This study demonstrated a way to exploring the relation behind pop album cover and reflection of history by applying digitizing technology. The development of both popular music and recording media are in parallel. Through the records publishing, pop music could be circulated in the general public. The albums cover is design as a carrier to load pop music upon popular music culture. It was hoped that the design of album cover could be applied to explore the contrast historical backgrounds and to distinguish the relationship between design and color attributes.

In this study, first we find out the denotation of those represented pop-album covers by applying content analysis procedure. Than we verified the relation between denotation and cooler attribute.

Upon statistic test results supported, it was concluded that color attributes are significant contribute to predict denotation. The logistic model was established for verifying the predicting relation between color attributes and denotation of pop album covers. The mean values of Red, Green, Black, and Luminosity channels are significantly contributing to foresee the denotation of pop album covers. This evidence

A simplified pop-music album denotation predicting-model was also presented to illustrate the rule and the decision making tree. There are two major colors could be used as simplified model to describe the relation between denotation and color attribute. Those two colors are green and red.

REFERENCES

[1] R. D. Tennent, "The denotational semantics of programming languages," *Communications of the ACM,* vol. 19, p. 17, August 1976.

[2] R. Barthes, Elements of Semiology, A. Lavers and C. Smith, translators. New York: Hill and Wang, 1973.

[3] T. Flew, New Media An Introduction. , Third ed. South Melbourne: Oxford University Press, 2008.

[4] D. McQuail, McQuail's Mass Communication Theory, 4th ed. London: Sage, 2000.

[5] P. Caplan, "What is Digital Preservation? "The Preservation of Digital Materials"." Library Technology Reports, vol. 44, p. 5, 2008.

[6] ASA, Guidelines on the Production and Preservation of Digital Audio Objects: IASA, 2009.

[7] H. H. Yang, et al., "Developing a Model of Technology Behavior Intension on Strategic Web Resource.," in the 10th WSEAS International Conference on APPLIED MATHEMATICS, Dallas, Texas, USA, 2006.

[8] Kuo, L.H., Yang, H.H., Yu, J.C., Yang, H.J, Lin,L.. (2010). Identifying the Course Role of In-service Learning via the Social, Network Structure. WSEAS Transactions on Communications,9(9),583-594.

[9] Kuo, L.H., Yang, H.H., Yu, J.C., Yang, H.J, Lin,L.. (2010). Identifying the Course Network Structures Based upon Records of In-service Learning Database. WSEAS Transactions on Communications,10(9),1224-1234

[10] Kuo, L.H., Yang, H.H, Yang, H.J., and Chen, C.H., Identifying a General Structure of Teachers' In-service Learning, International Journal of Education and Information Technologies, 6(1), 105-113.

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