
Study on the Model of Animation Style Using PCAF Case study: Stylized, Snappy and Limited Animation Style

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ABSTRACT (10 PT)

Stylized, snappy, and limited animations are three popular movements of animation nowadays. The objective parameters of this style never conducted previously. The researcher proposed a technique named Principle Contained Animated in Frame (PCAF) to obtain the model of animation style. The technique is basically taking information on how often the motion follows the 12 principles of animation. This study begins sampling for all of animated film styles where each style has three examples of films. After getting a percentage of each PCAF on principles of animation, some steps were conducted to find a model. Important steps are unelimination, ascending elimination and final position adjustment. The results of the study at the latest stage showed that the principles of animation like Arcs, Staging, Anticipation, Timing, Exaggeration, Appeal and Easy in & Easy out are the principles formed the special features which are shown in the pattern of stylized animation style, while the principles of Straight Ahead, Exaggeration, Appeal, Anticipation, Timing, Squash and Stretch, Easy in Out, Arcs and Staging formed the special features shown in the pattern of snappy animation syle and on the pattern of limited animation style, the principles of which indicated special features form of this style are Anticipation, Staging, Easy in & Easy Out, Solid Drawing, Timing and Appeal

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1. INTRODUCTION

Currently, animated films are familiar to the public. Even the people's interest in the work is very high because these works can be enjoyed by all people. The animated movie has distinctive features in order to attract the attention of the public, especially children. The distinctive feature are the characters, story ideas and animation styles. For developers of the animated film, they need to know the animated movement types as the guidance in making animated films. Animation style is inseparable from the basic principles of animation . Nowadays, it has 6 styles which consist of semi-realistic animation, realistic, hyper realistic, snappy animation, stylized animation, and limited animation. Semi-realistic style is used to create animated films to be more visible cartoonish and not look too real. Realistic style is a style of animation used to create an animated film based on the nature of human life. For instance, film fairytale Barbie used this style.. Usually animators use styles to minimize excessive and rigid object motion. Animation production house using motion capture to create the realistic style animated film. Hyper realistic style is a style of animation which is very good to use when making an action film animation. This style can highlight detail appeal and strength of character where the character displayed is very unique. Snappy animation is a style of animation that shows the nature of the cartoon. The characteristics of this style is the result of excessive movement of characters moving quickly and

spontaneously. Stylized animation is a style of animation that nearly in real but have a movement that is almost impossible exaggeration applied or carried out in everyday life. For example, a human and living beings will not be able to lengthen her legs many meters away. Limited animation is a style of animation that exist only on a 2D animated film. This style has a characteristic feature of limited movement. Animator should be able to describe the characters and objects to create illusion of limited movement portrayal of characters and objects. The creation of the movement of objects with any animation style is always to have a relationship with the principles of animation. It was first recognized 10 principles created by Frank Thomas and Ollie Johnston in their book, *Illusion of Life*, in 1981. Then John Lasseter, adding to 12 on paper at SIGGRAPH 1987 with the title of *Principles of Traditional Animation Applied To 3D Computer Animation* [7].

Reference [4] grouping the six types of styles based on the observation of the movement of the visual characters and other objects. The movement of characters and objects in the animated film is based on 12 basic principles of animation. Therefore, the authors argued that the observations of the 12 basic principles of animation on the movement of characters and objects could produce a model of the type of animated films. According to our observations, the implementation of 12 basic principles of animation for determining the style of an animated movie was never made. But the observation techniques ever used by the study [1] and [3] for a different purpose. Observation 12 basic principles of animation is done is to observe the level of their frequency of occurrence of these principles on the duration of the movie shot (shot time duration).

The research conducted by [1] found that the principles of staging, appeal, staging, straight ahead and pose to pose, follow through and overlapping, slow out and slow in, and arcs, is a principle that is often used on every shot, causes the animation more lively, natural and realistic. while in another study conducted by [3] states that their animated film "A Day to Remember" have a high percentage rate that is on timing, pose to pose, and staging.

We have hypothesized that each style has a specific pattern on the implementation of the 12 basic principles of animation. For example, for the film Limited style should have the timing in accordance with the real situation. Observations on the implementation Shot Time Duration 12 basic principles of animation is manually hard work due to two factors. The first factor is huge number of frames. As an example for the animated film that lasted 5 minutes, then the frame is observed amounted to 7200 frames. The second factor is the observation must be done repeatedly to get the logic (good understanding) of each of the basic principles of animation in several of frames. For example, if the logic of the principles obtained through observation n different frames only once, then it should be done a minimum of 12 times to get 12 Logic observations of 12 basic principles of animation. Because of the manually hard work, in this study we only choose 3 styles of six styles, stylized, snappy and limited style. The reason the we chose the three style is the level of difficulty making the motion at these style is low to medium. Limited style has a low degree of difficulty due to the style consists of a frame is limited. Stylized style has a difficulty level that is almost close to the medium in the process of its creation because of its movement closer to a real movement. Snappy style has a medium level of difficulty because the process of its creation has quick movement. Therefore, we are looking for modeling in any style of animation films shot by the parameter duration time (SDT) of the 12 principles of animation.

In contrast, according to the article written [4] there has been no definite value calculation of the percentage of the basic principles of animation. In other words, we have not known what principles and how often these principles is contained in motion of animation, especially stylized animation style, style stylized animation and limited animation style. We are looking for patterns of application of animation principles frequency for each style of animation that we studied.

2. THEORY

2.1. The structure of the animated film

The animated film is the result of animated images that move so that what is revealed to have the impression of space and time. Film is produced by recording images through the digitization process with added animation or visual effects. The physical structure of the animated film is [6]:

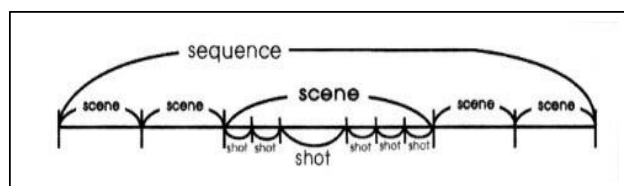


Figure 1. Structure of Animated Film

- **Frame:** Frame is the smallest unit in the film. Frames are like paper that has been drawn. If the frame is lengthened by 5 frames, then the paper reproduced 5 pieces with the same images. If we change the picture one frame, then the other frames will follow the changes in the image.
- **Shot :** Shot is this merging of several frame so into a picture that can be operated
- **Scene:** Scene is some combination of shot so that when display images previously only seen moving silent and impressed to have space and time. Scene also commonly called round
- **Sequence:** Sequence is the longest part of the merger of the scene. Sequence to form a story that we can see in the movies.

2.2. Principles of Animation

Principles of animation can be used as a reference by animators creating the characters movement. There are 12 principles developed by Walt Disney Studio during 1930s based on their result of reflection about their practice in animated production [8]. The list below are animation principles [5]

1. Squash and Stretch
2. Anticipation
3. Staging
4. Straight Ahead action and Pose to Pose
5. Follow Through and Overlapping Animation
6. Easy in & Easy out
7. Arcs
8. Secondary Action
9. Timing
10. Exaggeration
11. Solid Drawing
12. Appeal

Table 1. The Performance of ...

Variable	Speed (rpm)	Power (kW)
x	10	8.6
y	15	12.4
z	20	15.3

3. RESEARCH METHOD

The design of a flow as the methodology of this research is presented on Figure 2..

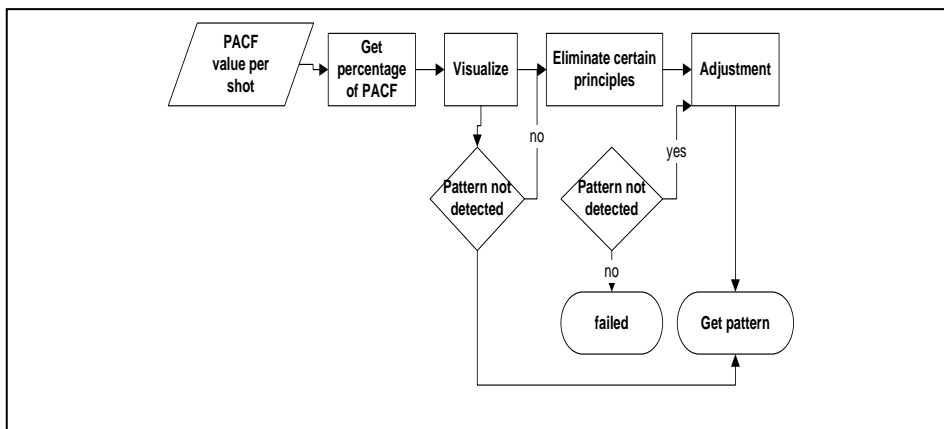


Figure 2. Flowchart of research

For each of PCAF Value , the researcher also develop a technique called Principle Contained Animated In Frame (PCAF). PCAF used to obtain information of time duration of frame containing motion that follow animation principles per a shot. Figure 3 shows the flowchart of PCAF.

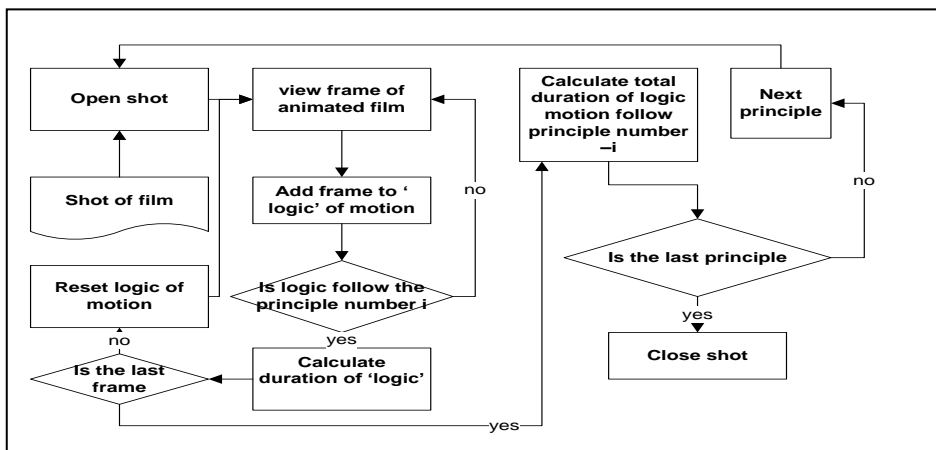


Figure 3. Flowchart of PCAF technique

PCAF value obtained using the equation as below:

$$PCAF_i = \frac{\sum_{j=1}^L D_{ij}}{\sum_{j=1}^L DL_j} \quad (1)$$

D_i : Length of frame that contain animation principle in shot – j

L : Length of Shot j

DL_j : Total Length of Frame shot – j

4. RESULTS AND ANALYSIS

4.1. Data profile

Stylized Animation Style film

1. Toy Story Toons : Extra Small Fry
2. Oscar's Oasis Episode 24 'The Great Escape'
3. Mickey Mouse "No Service" S01E01

Snappy Animation Style film

1. Resto
2. Goodnight Mr. Foot
3. Tom and Jerry Tales Episode Polar Pelir

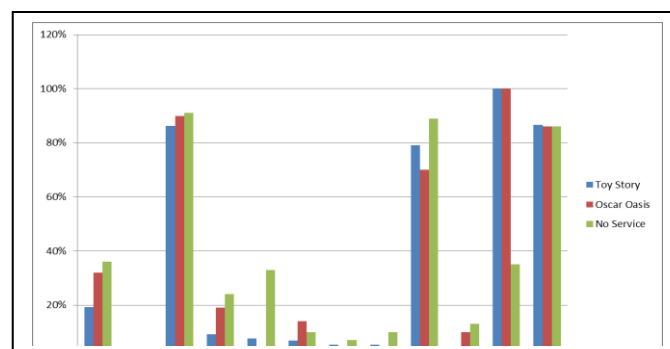
Limited animation style film

1. Yogi Bear - Trying to Escape Jellystone Park
2. Astro Boy Episode 1- The Birth Of Astro Boy_2
3. Fred Flintstone Golfs

4.2. Result and analysis

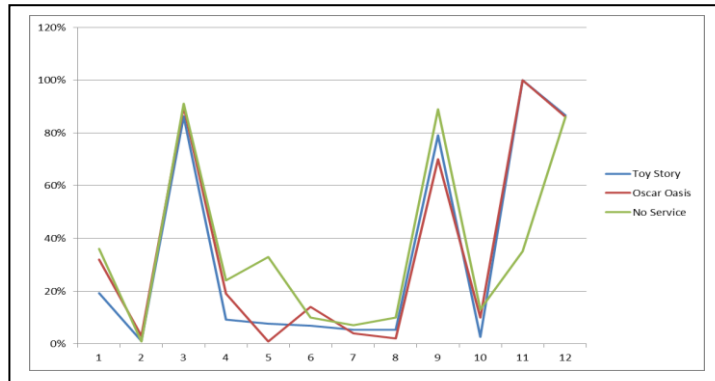
Based on figure 2, we present the results from unelimination (visualize step), ascending elimination (elimination certain principles step) dan Final position Adjustmen (adjustment step).

- 1) Unelimination

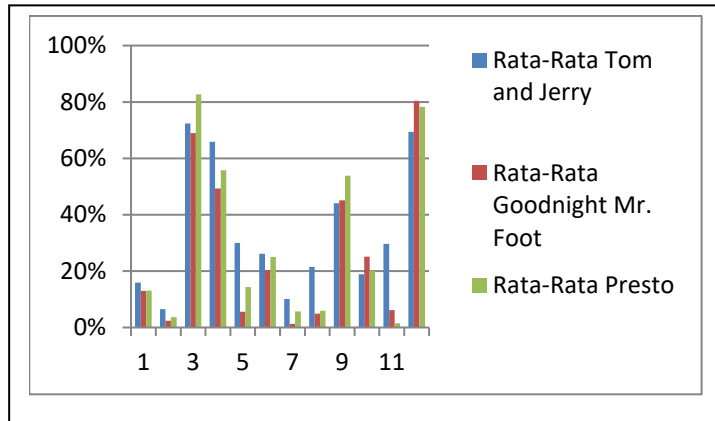


Graphic 1. Bar Stylized Animation Style PCAF Percentage

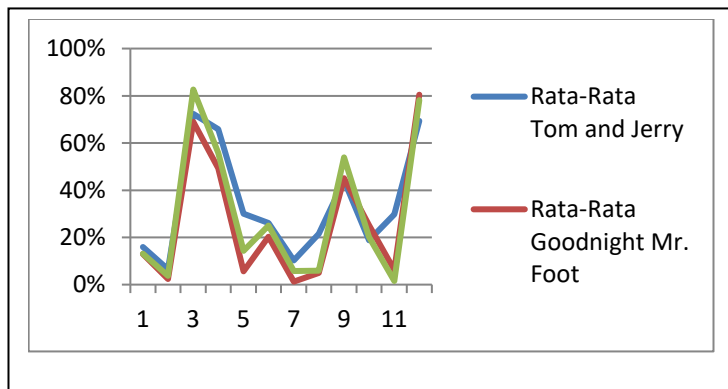
From the bar graph 1, it was created patterns by connecting with a line the value of each principle. The aim is to facilitate the observation in the search pattern. The result is a line graph as follows.



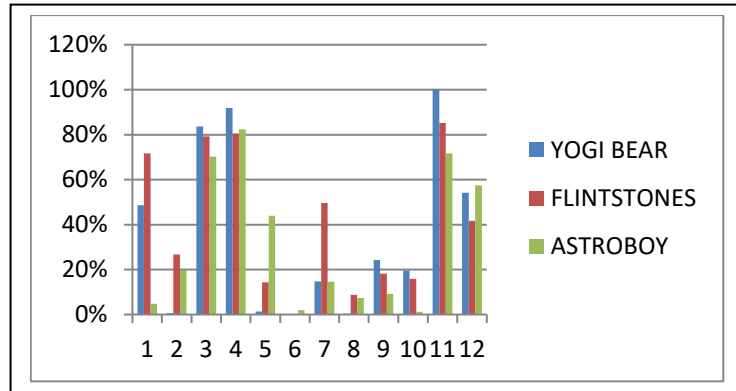
Graphic 2 Line Stylized Animation Style PCAF Percentage



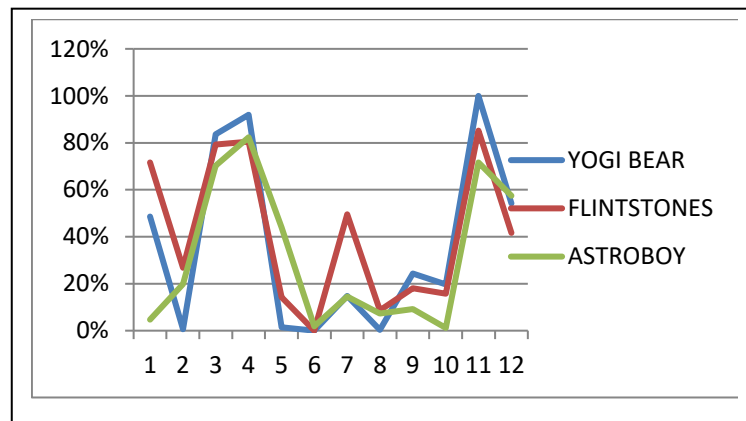
Graphic 3.Bar Snappy AnimationStyle PCAF Percentage



Graphic 4. Line Snappy Animation Style PCAF Percentage



Graphic 5. Bar limited Animation Style PCAF Percentage

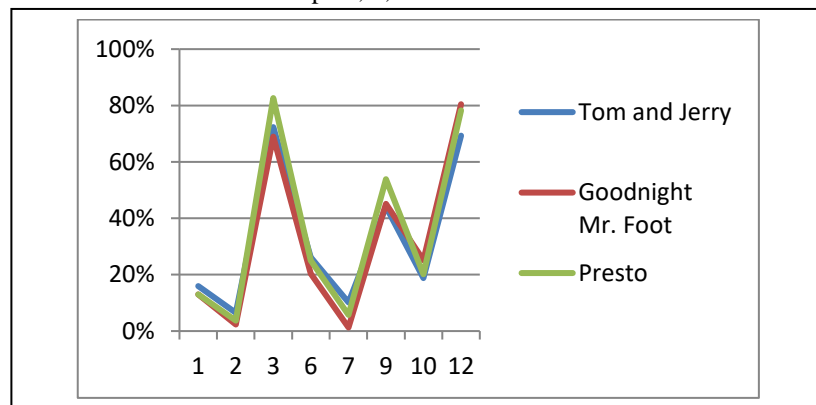


Graphic 6. Line limited Animation Style PCAF Percentage

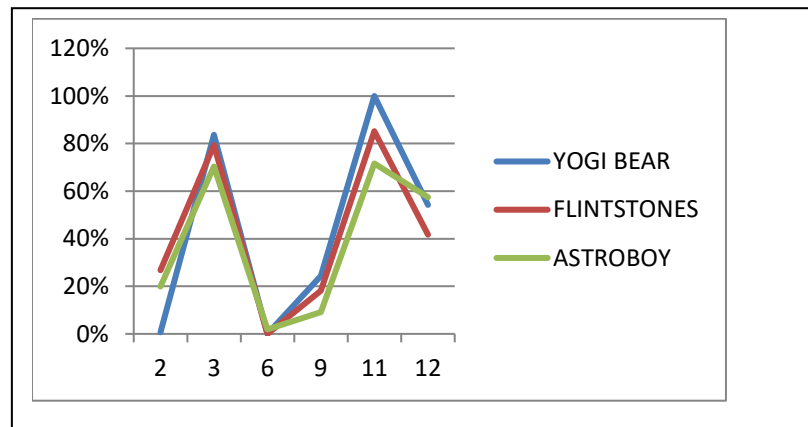
Based on the line graph 1 to 6, it did not produce a regular pattern on each film sample. Therefore, based on the flowchart, at figure 3, the elimination step needs to be conducted.

2) Ascending elimination

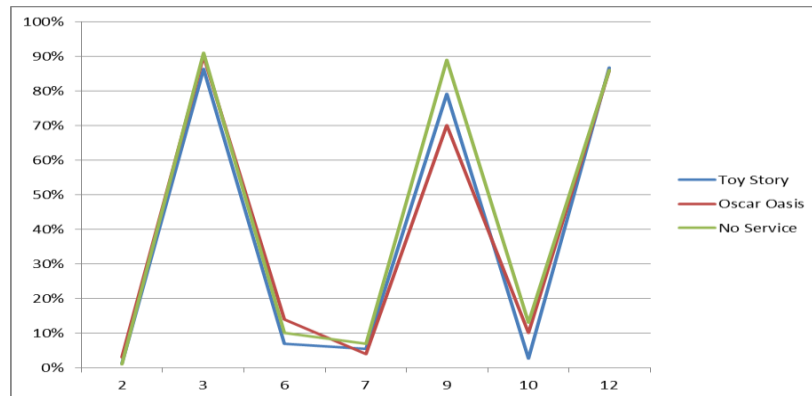
At this step, all of line graph style are manually check to find regular pattern as much as possible. Then removed certain principle values that didn't form regular pattern and conducted this step from principle number 1 to 12. That's why this step is called as ascending elimination. The results of ascending elimination are shown in Graph 7, 8, 9.



Graphic 7. Stylized Animation Style APCF Pattern (ascending elimination)



Graphic 8. Snappy Animation Style APCF Pattern (ascending elimination)

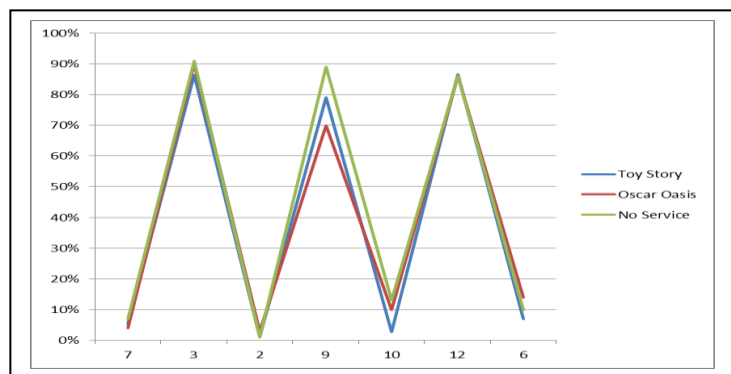


Graphic 9. Limited Animation Style APCF Pattern (ascending elimination)

In graphic 7, 8, 9, it can be seen that the patterns have been detected but still need to be repaired because there is small gap on certain principle values. For example in graph 7 at principle number 6,9,10. We also can see small gap in graph 8 at principle number 2, 3,6,7,9. While small gap principle in number 2, 3, 9, and 11 in graphic 9. Therefore, we need to adjust principle position to obtain better result based on the flowchart at figure 3.

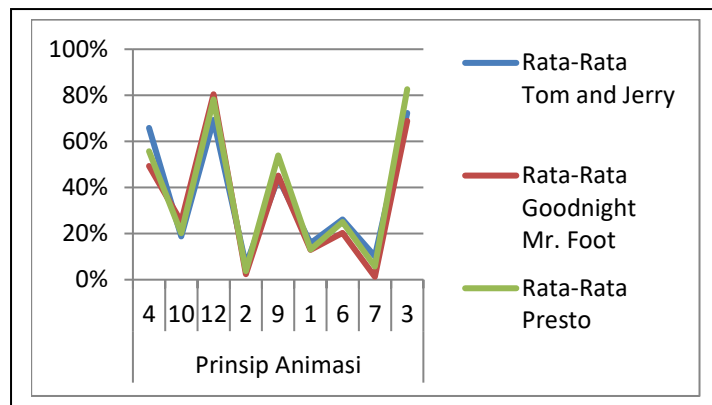
3) Final position adjustment

At this step, it was manually adjusted graph 7, 8, and 9 by swapping certain principle position to the other position. Graph 10 shows the following result.



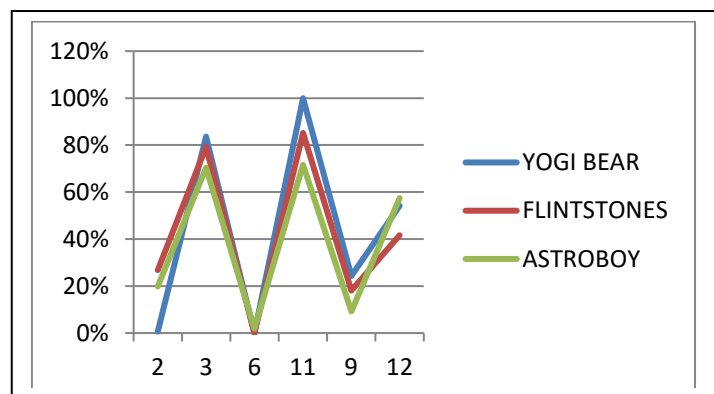
Graphic 10. Stylized Animation Style APCF Pattern (Adjustment)

Graphic 10 shows the basic principles creating similar pattern for all samples of stylized animation style namely arc, staging, anticipation, time, exaggeration, appeal and easy in-easy out.



Graphic 11. Snappy Animation Style APCF Pattern (Adjustment)

Graphic 11 shows the basic principles creating similar pattern for all samples of snappy animation style are straight ahead and pose to pose, exaggeration, appeal, anticipation, timing, squash and stretch, slow in and slow out, arch and staging.



Graphic 12. Limited Animation Style APCF Pattern (Adjustment)

Finally, Graphic 12 shows the basic principles creating similar pattern for all samples with limited animation style namely anticipation, staging, slow in - slow out, solid drawing, timing and appeal.

5. CONCLUSION

Further development of models with more objects on three types of animation films need to obtain more significant result statistically. The use of upper and lower bound are considered when we have more samples of animated film.

REFERENCES (10 PT)

[1] Karisma, Z., 2014, Pengembangan Model dan Menganimasikan Karakter dengan 12 Prinsip Dasar Animasi Pada Film THE CHOICE, Tugas Akhir, Jurusan Teknik Informatika Politeknik Negeri Batam, Batam.

[2] Muchtar, M., 2013, Animasi Flash : Animasi Frame by Frame, <http://www.idseducation.com/articles/animasi-flash-animasi-frame-frame/>, 06 November 2013, diakses 24 Agustus 2015.

[3] Nadeak, C, 2015, Short Movie Animasi 3D "A Day To Remember" untuk Durasi 00:02:36-00:05:04, Tugas Akhir, Jurusan Teknik Informatika Politeknik Negeri Batam, Batam.

[4] Pandya, V., 2013, Styles of Animation, <http://www.animationsupplement.com/index.php/articles/39-styles-of-animation>, 12 Februari 2013, diakses 23 Agustus 2015.

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- [5] Purnomo, W. dan Andreas, W., 2013, Animasi 2D, Kementrian Pendidikan dan Kebudayaan Republik Indonesia, Jakarta.(2011). Penulisan Ilmiah, 20
<http://storage.jakstik.ac.id/students/paper/penulisan%20ilmiah/30404112/B%20II.pdf>, diakses pada tanggal 22 Agustus 2018.
- [6] Riani,<https://sarasvatid.files.wordpress.com/2010/02/multifilmmedia1.pdf>, Diakses pada tanggal 28 September 2019. at 09.19 WIB.
- [7] Zeembry, 2006, 12 Jurus Pamungkas Animasi Kartun dengan Flash 8, Penerbit Gramedia., Jakarta. 12 principles of animation ,
- [8] http://minyos.its.rmit.edu.au/aim/a_notes/anim_principles.html, accessed 20 june 2019