

Identification of 2:3:5 Ratio as a Visual Composition Technique on Website and Android Application Mobile User Interface Design

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Abstract

This paper extends the previous paper written by author for ADADA International Conference 2017 to introducing 2:3:5 ratio as a finding in order to seek a simplified approach from 1:1.618 golden ratio known as the golden section. The 2:3:5 ratio used to identify the visual of nature proportion and composition in two dimensional picture, the ratio then used to find its property to be identified further in user interface composition design of a website and *android* mobile application that presumed to be designed by using the golden section. This research purpose is to find the 2:3:5 ratio's properties and consistencies through visual identification for its future implementation in website and mobile user interface design as composition technique in order to please the eyes the way golden section naturally does with simpler steps.

Keywords: identification, composition, 2:3:5 ratio, website and mobile apps, user interface

1. Introduction of The 2:3:5 Ratio

Digital mobile user interface (UI) composition is a process of arranging visual elements in digital interactive media interface with proper consideration of principle of art and design. There are certain composition techniques we can use as design guide such as grids, rule of thirds, and also golden section. These techniques already described on the previous author research paper about exploration phase of developing simple visual composition technique using 2:3:5 ratio [1]. Considering its complexity, if the latest technique was applied correctly, it can deliver most sophisticated and natural visual arrangement result for pleasing the eye. However, until 2017, the Golden section technique has no solid usage of applied guidance on art or design, therefore the UI artist and graphic designer has to interpret on their own how to apply that golden section into their visual arrangement.

2:3:5 ratio or in the previous research author self named it Riz ratio, is way for a visual composition technique to achieve near result of sophisticated and natural proportion as golden section does without digging as deep with the complex mathematical sequence number. This paper is continuing the previous research to find, identify, and describes the possibility the 2:3:5 ratio in a website and the mobile application user interface design to build further assumption of the ratio that can be used as a composition technique in digital visual of art and design.

2. Identification Process using the Ratio's

The identification process is starting with selecting the best numbers used for the ratio, these number are the basic for visual composition development so its better to have relation with visual principles. The next step is converting the ratio numbers into basic visual shape for visual picture identification process.

The basic geometrical shape is preferred in this step, because of its property consistencies were needed in the next identification process. Rizaldi [1] in previous research already testing this shape for identification the ratio on nature pictures and finds shape composition behaviour.

The next step is 2:3:5 ratio identification in user interface (UI) of mobile android application using the composition behaviour of basic shape and search for its behaviour pattern in the android mobile apps UI and then applied the findings on to website UI identification process.

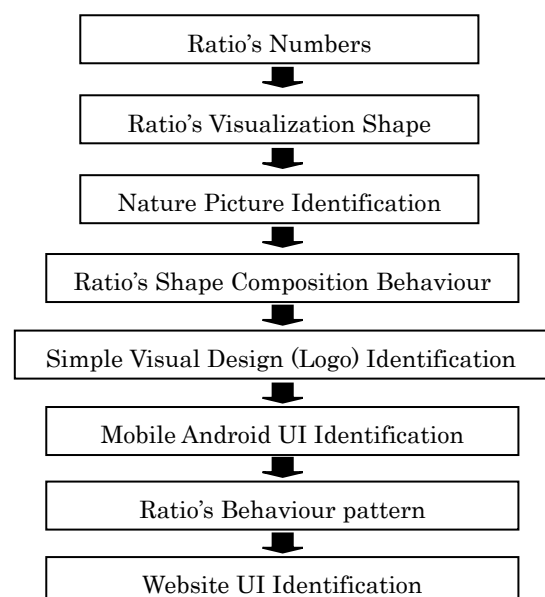


Fig. 1. Identification Process

3. About Number 2, 3, and 5

A. Selecting The Numbers

The number 2, 3, and 5 as the first prime numbers were picked because of their strong relation to basic principle and visual elements. Number 2 represents pair, balance, contrast, comparison, harmony, and ratio. These visual principles from number 2 can also be observed and appear in nature like the balance of human body, reproduction, balance of day and night. Number 3 gives a different attribute from number 2 in visual principle and also in nature. With number 3, we can find the position middle and between, visual principle of hierarchy, rhythm, unity, cycle, and a visual form of 3D axis, triangle shape and also primary color (RGB). In nature, number 3 can give us the time setting of past-present-future, and example of nature using number 3 is on stable particles (neutron, proton, electron). Number 5 can give more detailed principles about direction, continuity, gradient, combination, and color harmony. While in nature, we can find that number 5 is represented by five natural human senses, five nature elements, human finger, even in star fish.

Number 2, and 3 are the adjacent number but cannot be replaced by each other, while the number 5 is the sum of the two. Number 1 and 4 that missing is not used by the ratio because the number 1 that can be used to represent a starting point, emphasis or anomaly can be placed anywhere without any connection with the entire composition. And the number 4 attributes and characteristic is replaceable by the number 2.

B. The Golden Section Connection

The golden section [2] is a composition technique using the golden ratio that using the fibonacci sequence (1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233,...) that each number on the sequence is the sum of the previous two. The golden ratio is using the ratio of adjacent number from that sequence that approaches 1:1.618. When the golden section is visualized with the golden ratio, they can form a spiral line that also appear in chambered nautilus, the spiral growth pattern of sunflowers, even in the human faces. Therefore the golden section is also called the divine proportion, because once the ratio applied correctly, it can give a pleasing composition, because its connection with nature proportion as shown in Fig. 2 below.

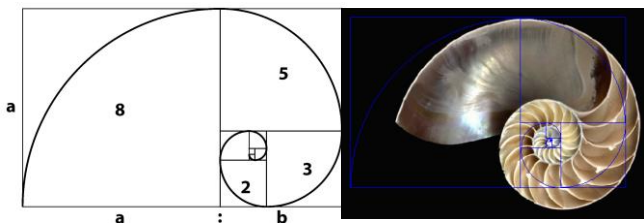


Fig. 2. Visualization of the golden Ratio and Similarity with The Chambered Nautilus spiral form.

(<https://www.goldennumber.net/nautilus-spiral-golden-ratio/>)

4. Visualizing the 2:3:5 Ratio

The best way to identify the process of the ratio in the visual composition is to visualize the ratio first. The best possible way to convert the ratio into visual is by using the geometrical shape with consistency on its scale. The circle shape is best fit of all geometrical shape because of its equidistant point value from the center point [3], so it can preserve better ratio consistency on scaling purpose. On the nature identification, the circle shape is mathematically represents mental construction which possess conceptual and figural properties of nature [4] to identify the ratio which each circle diameter is representing each number on 2:3:5 ratio.

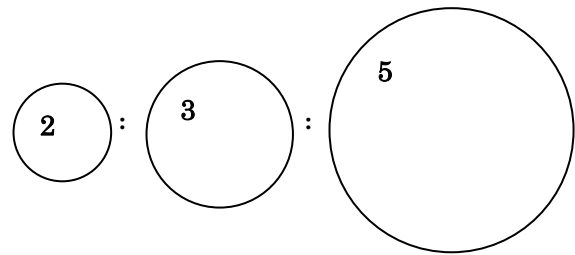


Fig. 3. Visualization of 2:3:5 ratio on circles as geometrical shape

The arrangement of 2:3:5 ratio used in visual of nature proportion is that the visualization of the ratio can be placed everywhere, also can be scaled, stacked, and repeated many times as necessary. The combination and connection of three circle as visualization of the ratio can be used as linked or be united to each other, and also can be used separately, as long they were treated consistently on a different visual group, or as a whole composition, Fig. 4 below showing the simple combination of the ratio's shape.

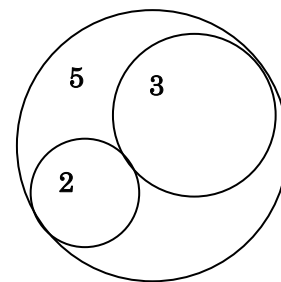


Fig. 4. Simple Combination of circles using 2:3:5 Ratio

In the previous research [1], the first identification process was done in nature composition and proportion using the good looking nature pictures that author found on the web. The next step was to apply the visualized of 2:3:5 ratio with the circle shape into the nature picture to identify the ratio and building an assumption that the 2:3:5 ratio is having close relation with natural composition from golden section but with more simple process and easy to apply. The result of ratio's shape composition identification on nature picture proportion is show on the fig. 5 below:

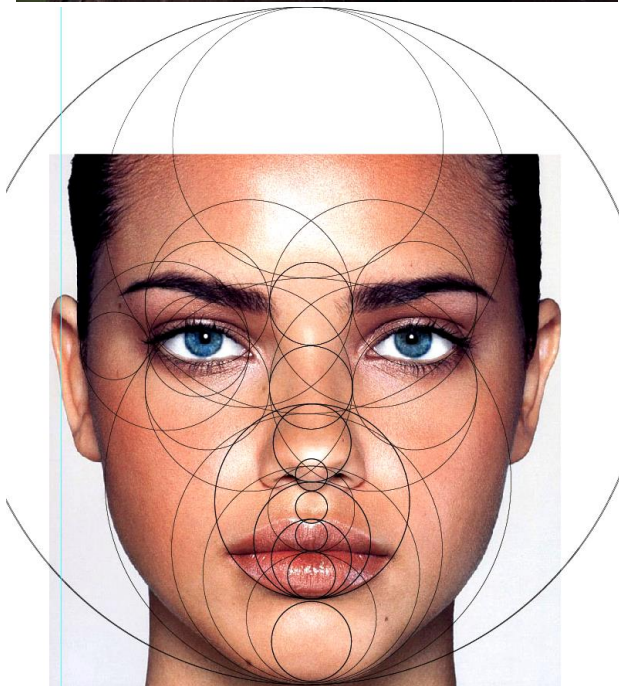


Fig. 5. Previous research example of identifying the ratio on Eagle and human face. (Image source: previous research by author[1] from source: [Eagle: <http://www.gettyimages.com/> by: Andrew John Page and Craig A. Mullenbach. Face: <https://jamiebryanmedia.files.wordpress.com/2014/06/original-face.jpg>])

The result of identification with nature picture above, showing that the ratio is fit with sample nature picture, not only in animal picture, but also in complex human face composition. In the identification process, it shows that the 2:3:5 ratio had to be multiplied, scaled, and combined each other in each visual segment. For example, the lips, chin, and the tip of the nose in human face picture is linked each other and form the cluster of ratio's visual combination.

Based on result above on identifying the ratio's in nature proportion, we can find a cluster composition of ratio's shape usage. Fig. 6. below is show the sample cluster combination of shape composition as visual representation of 2:3:5 ratio.

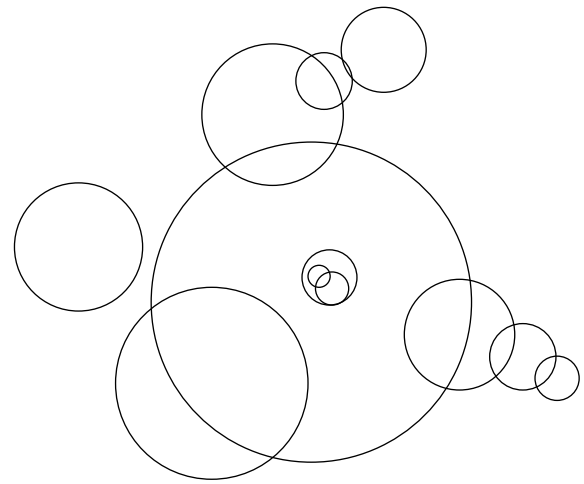


Fig. 6. Example combination of multiple circle ratio as visual representation of 2:3:5 ratio.

5. Identifying the 2:3:5 Ratio on Website and Mobile Application User Interface

After the identification on nature visual proportion, we can assume that the 2:3:5 ratio can be identified on the nature proportion picture with the circle shape as a 2:3:5 ratio visual representation. The next step in this research paper is to find the ratio in a well-designed visual composition in a website and mobile application that author find was designed using the golden section. For this, author used the Google Play Store, and National Geographic website.

The author intensionally using both Google and National Geographic that presumed designed [5] using the golden section because the author wanted to identify if the ratio is there alongside the golden section to make an assumption that 2:3:5 ratio can also be used in user interface design to create a design composition as pleasing as golden section but simpler to apply. Fig. 7 below shows the previous identification on google logo [6] that was designed using the golden section that can also identified with the 2:3:5 ratio.

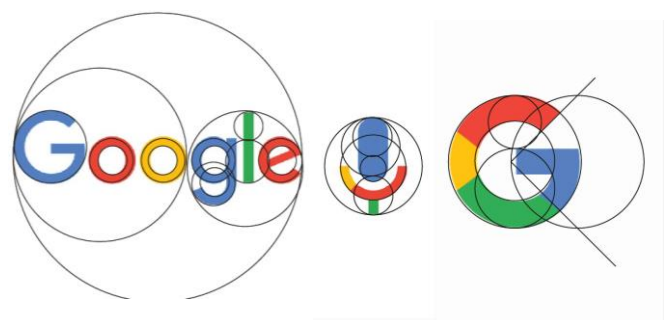


Fig. 7. Previous research [1] result on identifying 2:3:5 ratio on Google logo design. (Image source: <https://design.google/library/evolving-google-identity/>)

The identification result of *Google* logo showed that the 2:3:5 ratio can be found in the visual logo and other *Google* visual identity. Therefore the author assumed that other product of *Google* like *Google Play Store* as android application also have visual user interface that was designed by the same visual composition technique. In relation with that, author also wanted to compare the identification of 2:3:5 ratio on mobile user interface with popular android application, ranked by number of active user of social network, *Facebook* [7].

As show on fig. 7 above, the circle shape still can be used as visual representation of the ratio that can be applied in a picture proportion or composition of visual design. Therefore, the same shape will be used in further identification on user interface visual design and website. The arrangement and composition of ratio's circle combination is also used in the same behaviour as in previous identification process both in nature and in the visual design.

User interface (UI) on android application by *Google* is also assumed using the same visual composition technique using the golden section technique. The identification process of 2:3:5 ratio on mobile user interface design on *Google Play Store* (Fig. 8) and the comparation with *Facebook android* (Fig. 9) application is below:

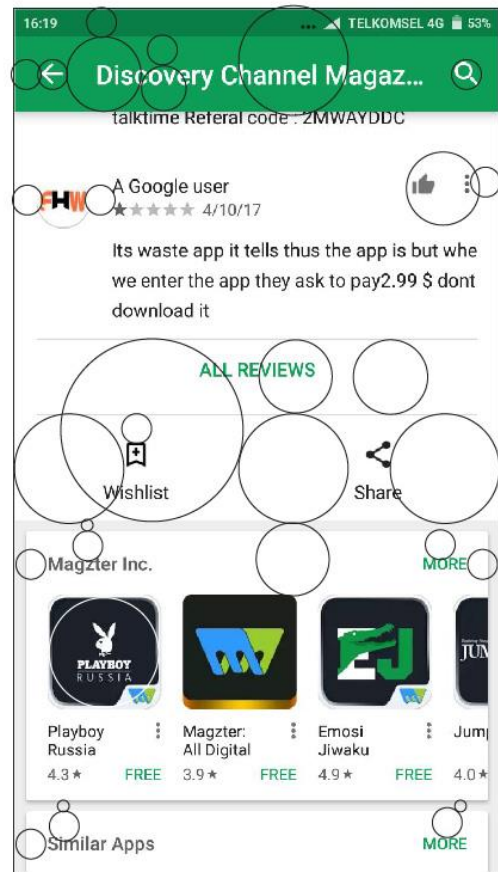
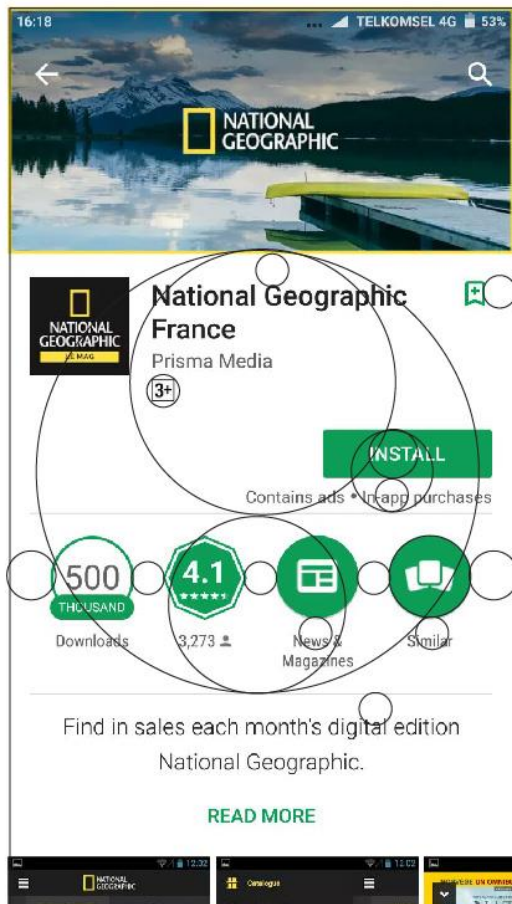


Fig. 8. Identification process of 2:3:5 ratio on mobile user interface of *Google Play Store* (Image source: *Google Play Store*)

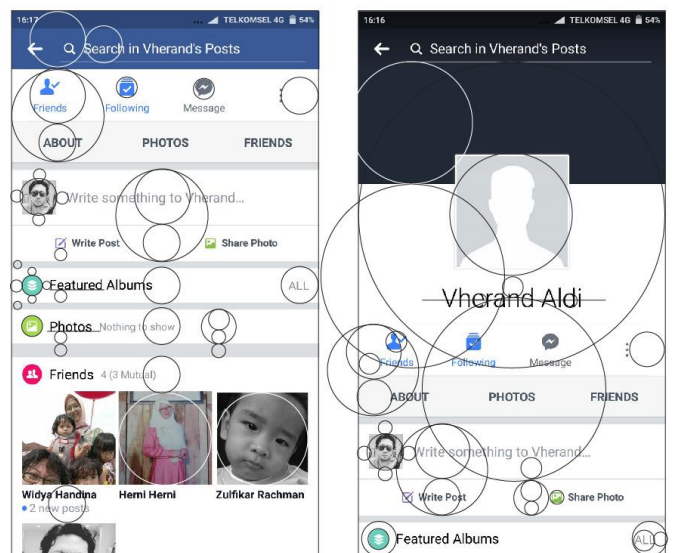


Fig. 9. Identification process of 2:3:5 ratio on mobile user interface of *Facebook android* application (Image source: *Facebook android mobile application*)

Identification process of 2:3:5 ratio on both *Google Play Store* and *Facebook* Android mobile application user interface was done with similar process, and the result is, both mobile application shown that the 2:3:5 ratio can be identified on their user interface design. The visual composition or element arrangement of user interface design on both *android* mobile application is placed based on grids that guided by arrangement of circles combination as visualization of 2:3:5 ratio. The first assumption of this process is *Facebook* mobile and *Google Play* as an android application seem to design its user interface with consideration of golden section composition technique, therefore the 2:3:5 ratio can be identified on its UI design.

Behaviour pattern of the ratio identified on UI design of two sample *android* applications above as the result of identification process are explained below:

1. The visualization of 2:3:5 ratio can be formed in combination of more than one ratio that linked each other in a whole visual or image cluster.
2. Visualization of 2:3:5 ratio that contain 3 circles can be used separated or attached each other and also from its group in a cluster.
3. Circle shape as visualization of the 2:3:5 ratio can be used for placing the elements position and treated the alignment of the elements.
4. Most of the ratio used in two or three different scale and repetition of the ratio should be scaled down based on the lowest circle diameter that represent the number 2 on the 2:3:5 ratio.
5. The maximum scaled of 2:3:5 ratio depends on the screen (device) area and or maximum space of each visual elements cluster.
6. The visual of 2:3:5 ratio attached on each other in a cluster of visual elements may have a repetition of different scale of the ratio.
7. The 2:3:5 ratio on each visual cluster can be related or have the same size as different group of visual elements in a whole composition.
8. The same repetition of images can using the same combination of ratio's visualization.
9. Each circle that represent the 2:3:5 ratio can be duplicated individually without having to duplicate the whole ratio's, but cannot be scaled up/down (resize) individually.
10. There are no resizing limitation in ratio's visualization, it can be scale up and down without size limitation as long as the ratio is intact.

Website user interface design involving much larger area when opened in desktop screen. The identification process below (Fig. 10 and Fig. 11) are done in desktop version of *National Geographic* website. Using the same pattern behaviour as the identification process on mobile user interface, the author identified 2:3:5 ratio on the *National Geographic* website as shown below:

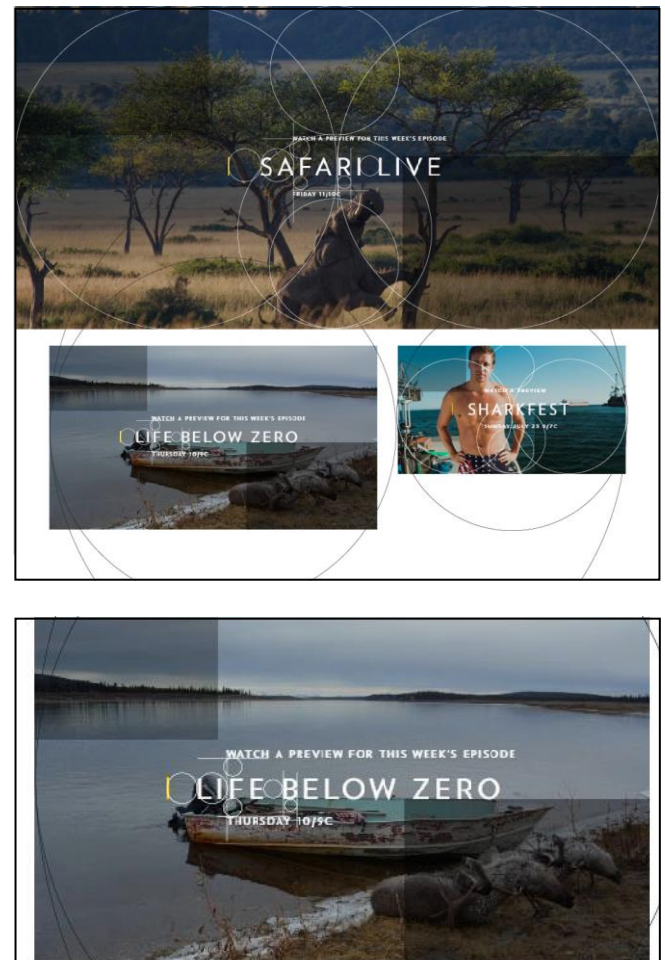


Fig. 10. Identification process of 2:3:5 ratio on National Geographic website user interface design - above: the main composition, below: detailed part of the bottom left of the main composition (Image source: www.nationalgeographic.com)

The user interface design of *National Geographic* website is also shown the same pattern behaviour of 2:3:5 ratio in a larger and more complex scale and even in more cluster of images than mobile *android* application. This proved the assumption that National Geographic website user interface also designed in consideration of using the golden section composition technique and that also proved that 2:3:5 ratio can be identified on visual user interface composition website design using that composition technique. The different of website from mobile UI design is that a website design is consist of multicluster of images on a larger screen. Therefore the combination of cluster composition of ratio's shape is more complex than the mobile version in the whole web visual composition.

Next figure (Fig. 11) is showing the other cluster of visual composition in *National Geographic* website that has a different style of layouting.

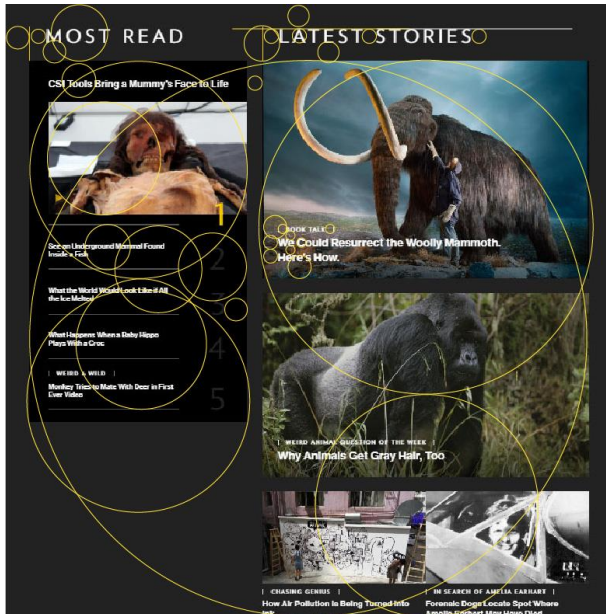


Fig. 11. Behaviour pattern example of 2:3:5 ratio on National Geographic website user interface design (Image source: www.nationalgeographic.com)

The overall user interface design of *National Geographic* website is also shown the same pattern behaviour of 2:3:5 ratio in a larger and more complex scale and even in more cluster of images than mobile *android* application. This proved the assumption that National Geographic website user interface also designed in consideration of using the golden section composition technique and that also proved that 2:3:5 ratio can be identified on visual user interface composition website design using that composition technique. The different of website from mobile UI design is that a website design is consist of multicluster of images on a larger screen. Therefore the combination of cluster composition of ratio's shape is more complex than the mobile version in the whole web visual composition.

6. Conclusion

2:3:5 ratio as a new visual composition technique can be identified in selected website and *android* mobile application user interface design that assumed by author are designed using the golden section composition. Therefore the 2:3:5 ratio can also be assume had certain attribute as same as the golden section, and can be used to pursue the 'pleasing to the eye' effect for natural composition and proportion design. The other mobile apps and websites UI design is not yet to be identified using this ratio. This process of identification are also discover a certain ratio's behaviour pattern that can be used as basics to unlock new possibilities of ratio's usage. This certain behaviour pattern is still under testing and development for future identification process on multiplatform UI.

The future research and consistency of development of this 2:3:5 ratio composition technique can give the UI artist more room to explore their creativity on designing user interface, and also make the design more pleasing to the eye as the

golden section naturally do with simpler steps and easy to understand guidelines of ratio's usability in various UI design projects.

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