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Implementation Of Art And Technology In Batik Purwakarta _Abstract: Indonesia is dominated by cities that have a history of batik, but Purwakarta does not have a history of batik. But thanks to the persistence of policy holders, Purwakarta currently has batik obtained by elevating the local wisdom of the city of Purwakarta. Through surveys and interviews, several batik designs have been made.

Batik design is inspired by food and tourist locations which form the basis of the formation of typical Purwakarta batik motifs. Jatiluhur Dam, Datura Metel L. Flower, Sate Maranggi, Mangosteen Fruit is a local wisdom owned by the city of Purwakarta. The results of the morning glory batik design and Jatiluhur dew through mathematical and turtle charts are then formulated so that the batik motif design can be saved by documenting the mathematical equation or the pseudocode of the batik motif.

With the results of digital motifs, the process of repeating patterns, duplicating and storing data becomes easier. _ _Keyword: Batik Purwakarta; Graphics turtle; Graphics mathematic; Datura metel L; Jatiluhur dam etc…

INTRODUCTION Indonesia is dominated by cities that have a history of batik, but there are some cities, especially in West Java that do not have a history of batik.

One example is Purwakarta, which previously did not have a history about batik but now it has succeeded in making it happen. Currently Purwakarta is experiencing a very significant investment growth. Strategic and dynamic position in West Java which is traversed by the arteries of trade, transportation and the national economy.

One opportunity that continues to be encouraged is the birth of batik motifs that can raise local wisdom. Purwakarta, is a district whose community grows and develops from thick history and tradition. Purwakarta has a variety of potentials capable of supporting regional ekspansion and development.

Among others, the potential in the fields of economy, industry, agriculture and tourism. With its cultural capital and potential, Purwakarta has become a dynamic and growing area, without leaving its Sundanese tradition basic. Purwakarta is also known as the paradise of sate maranggi. Now it is also developing the potential of its distinctive batik.

The motifs of food and regional art are considered to be the main attraction. This can be realized into batik motifs and some of them have already been realized in the form of batik cloth, thanks to the persistence of policy holders. The potential of Purwakarta in elevating local wisdom into batik motifs is a long journey.

The time series proves that it is not easy to realize a motif that is appointed into a batik motif. The problem raised in this paper is how is the local potential raised into batik motifs? Is the motive behind the story explicitly told to the public? How is the role of digitalization in developing batik motifs. To answer these problems, we need a method in making the batik motif.

LITERATURE REVIEW (IF ANY) In this journal (Garnadi, Guritman, Kusnanto, & Hanum, 2012), the unit lattice (17 types of repetition patterns of the crystallographic group used in the batik classification) will form a batik pattern on a flat plane. Data on 262 batik patterns were collected in this study, in the form of geometric and non-geometric patterns, and arranged from various shapes of circles, triangles, rectangles etc. Unit lattice can be determined from geometric batik, while for non-geometric batik lattice units cannot be determined.

The process of shifting, rotation and shear reflection can be formed from batik patterns, so that the repetition will form a grid, namely: rectangular, parallelogram, rhombus, square and hexagonal. In this journal (Adnyana, Kesiman, & Wahyuni, 2013), it describes

the use of the Delphi programming language as an application for making batik patterns by utilizing the fractal method so that the result is a variation of leaf motifs.

In addition to the geometrical operations that need to be performed, image processing is also performed, namely: "negative image", "image blending", 'threshold "and recursive algorithms. In this journal (Hariadi, Lukman, & Destiarmand, 2013), it describes the fractal characteristics possessed by batik by applying the Fourier Transformation, and then it will be displayed in the form of batik fractal dimensions.

The factors that contribute to making self affinity (as one of the important fractal characteristics) are the Isen process. Furthermore, the method used to test the dimensions and classify batik according to the pattern and region is the Anova test. With the existence of fractals as a characteristic of batik, it proves the complexity in traditional art.

So that the measurement tool for making patterns can use fractal dimensions as a comparison between batik fractals and traditional batik. The software known as jBatik has been developed as an algorithm implementation for making Fractal batik, and in the end will be a tool for making new patterns for batik makers.

In this journal (Prastyo & Mulyana, 2014), the basic pattern of a circle from an image is described, which is then mathematically formed through fractal geometry. Various new circle patterns can be produced by applying the basic pattern of the circle to the fractal formula, because the concept of fractals can produce similarity of patterns at all scales.

Furthermore, to make a variety of fractal patterns can be done in terms of graphics, color, size and style, so that in the end it can overcome the problem of limited circle motifs. The motives produced are increasingly diverse from simple forms to unique shapes by utilizing computer devices and software applications and computer technology.

The increasingly diverse and beautiful batik patterns can be produced with the existence of fractal-based circle patterns. In this journal (Saefurrohman & Ningsih, 2016), it is elaborated on the development of various shades of batik owned by the guardian batik motif, namely: Dewi Semboja, Ilir Ilir Batik, Isuk Afternoon Batik, Paddy and Cotton Batik, Puspowarno Arum Batik, Putri Batik Embarrassment, Asmaranala Rimpang Batik, Wahyuning Sumulur Batik, Klaras Godong Gedang Batik to Batik Ringin Cakra Mustika are batik motifs that illustrate the journey and philosophy of saints when developing Islamic religious propaganda in the land of Java.

Of the various types of designs and various designs of Wali batik motifs, then an example of patterns produced using the fractal concept and the L-System algorithm is the Kembang Isuk Sore pattern with a fairly profound philosophy: Datan Serik Seagrass Ketaman, Datan Susah Seagrass Kelangan (with meaning do not be easily discouraged when a disaster strikes, do not be sad if lost) to be reconstructed and generated using fractal and L-System algorithms.

The steps for defining fractal batik, namely by grouping fluffy floral motifs and buds into references, making Sulur more structured to be changed in a simpler form In this journal (Dewi, R A M, 2016), the use of fractal methods for developing the Banyuwangi Oling elephant batik is aimed at enriching the form of Banyan Oling elephant batik. Figure 1 shows the form of Banyuwangi elephant batik which is commonly found.

In this journal (Prasetyo & Simatupang, 2019), it describes the use of the LBP Run Length method and the Sine-cosine optimizer to improve batik motifs, namely by adding color features that will be the differentiator of batik motifs. Improvements to the batik motif have been carried out with LBP mp1 and LBP rfu2 methods, as well as the incorporation of MRL from LBP and color features on batik that will produce good accuracy.

In this journal (Marom, 2017), it is explained about the use of the wolframs mathematica-based programming language as one of the software applications for batik development using mathematical concepts namely specifically fractal geometry. In this journal (Wulandari, Purnomo, & Kamsyakawuni, 2017), the Labako batik pattern is described which is a typical batik pattern from the city of Jember.

The origin of the term Labako from Madura: "La Bako", which describes the activities of farmers doing the planting and processing of tobacco leaves. In Labako batik, the form of tobacco leaves becomes the most important feature because Jember Regency is one of the best tobacco producing cities in Indonesia. The use of the L-System for the development of the Labako batik motif and then combining it with the fractal geometry of the dragon curve and utilizing modeling using Matlab software.

In this journal (Setiani & Suyoto, 2010), the digital image processing is described to detect edges of Javanese batik patterns, such as the use of the Elisabeth, Prewit, and Sobel methods. The advantage of using Prewit is good handling for straight lines and reducing noise. While Sobel is good for handling curves but produces more noise.

Therefore, trying to combine the Prewit and Sobel methods, Elisabeth's method is better at detecting vertical and horizontal straight lines and reducing noise so that the results are better and clearer when detecting edges, when the color of a curve has the same

value as the pixel value of its environment. In this journal (Shidi & Suyoto, 2011), the digital image processing is described to detect the edges of batik patterns (machete motifs, slope motifs and lyrical udan motifs), namely the use of the Canny, Prewit methods, and their incorporation into the Thomas method.

The difference in the results of the three methods is seen in terms of accuracy, quality of results and clarity, and subsequently will get a unique pattern of machete motifs, slope motifs, and lyrical udan motifs. For data storage needs that are simpler and require a little memory from the batik motif using "turtle graphics". "Turtle graphics" which produce batik motifs, will then be used as a reference for the initial batik patterns for the next process, namely the production of batik by hand or with a stamp, which will increase the productivity of batik making. The above studies discuss batik patterns using various methods in the field of science.

the difference with the research conducted by the research team is that batik motifs are derived from the potential and local wisdom in the Jatiluhur-Purwakarta area. As for the motifs made using mathematical graphs and turtle graphs, they will then be implemented onto a piece of batik cloth. METHODS The method used in making the motif begins with the method of surveying and interviewing, field exploration.

The data obtained is reduced and the results are sorted and then sketched and the mathematical formula is made. This was later developed into the Jatiluhur batik motif. One example is the famous food of Purwakarta which is famous for its satay maranggi as can be seen in Figure 1 (a) which was appointed as a batik motif as in Figure 1 (b) and Figure 1 (c). seen in Figure 1 (a) which was appointed as batik motif as in Figure 1 (b) and Figure 1 (c). / (b) (c) Figure 1.

(a) Satay maranggi (b) Motif batik satay 1 (c) Motif batik satay 2 Then the local mangosteen fruits such as Figure 2 (a) are raised into batik motifs as in Figure 2 (b) and Figure 2 (c). // (b) (c) Figure 2. (a) Mangosteen fruit (b) Mangosteen batik motif 1 (c) Mangosteen batik motif 2 There is also the natural wealth of Purwakarta namely the Datura Metel L.

flower as shown in Figure 3 (a), and the Jatiluhur dam in Figure 3 (b), inspiring the manufacture of morning glory batik such as Figure 3 (c) and Figure 3 (d). / (b) / (d) Figure 3. (a) Datura Metel L. flower (b) Jatiluhur Dam (Anonim, 2020)(c) Morning glory batik motif 1 (d) Morning glory batik motif 2 One of the other inspirations comes from the water droplets produced by dew on the trees as shown in Figure 4 (a), which results in Jatiluhur dew motif designs as in Figure 4 (b) and Figure 4 (c). / / (b) (c) Figure 4.

(a) Dew drops (Pixabay, n.d.) (b) Motifs of jatiluhur dew batik (c) Motives of jatiluhur dew batik The method for digitalization used in the implementation here is a turtle graphics and mathematics graphics (Lindenmayer, 2004) (Lindenmayer, 1968).

Turtle charts are used for arbitrary batik motifs and mathematical graphs are used for batik motifs that can be formulated using mathematical equations (Dobashi, Kaji, & Iwasaki, 2019). Before drawing a graph turtle, the batik motif is sketched first on paper, then we formulate the graph equation. The basic idea of turtle interpretation is given below in Table 1.

The state of the turtle is defined as a triplet (x, y, a), with Cartesian coordinates (x, y) representing the position of the turtle, and the angle a, called the heading (head), is interpreted as the direction the turtle faces. Given the step size d and the incremental angle d, the turtle can respond to the commands represented by the following symbols (Figure 5(a)).

For example, see Figure 5(b), the turtle first faces upward then moves three steps forward, the turtle rotates 90 degrees to the right and moves 3 steps forward, rotates 90 degrees right, two steps forward and spin right 90 degrees forward two steps, spin left 90 degrees, go forward one step, spin right 90 degrees forward one step. This command can be abbreviated as FFF-FFF-FF-FF + F-F. / Figure 5. (a) Turtle interpretation of the string symbol F, +, -. (b) Interpretation of a string.

Increased angle d equals 90?. Initially the turtle faces upwards. Table 1. Turtle graphics commands Symbol _Interpretation _Meaning _ _F _Move forward and draw a line _Proceeding one step along d. The state of the turtle changed to (x ', y', a), with x '= x + d.cos a and y' = y + d.sin a. Draw line segments between points (x, y) and (x ', y').

_ _f _Move forward without drawing a line _Go one step long d without drawing a line _ _+ _Turn left with the angle d. _The state of the next turtle is (x, y, a + d). Positive orientation from a counter-clockwise angle. _ _- _Turn right with the angle d. _The next turtle state is (x, y, a - d). _ _push _Remember the current state _Remember the current state (position, angle, line color).

_ _pop _Restore the last remembered state _Restore the last remembered state and remove it from the list of remembered states. _ _ The mathematical formula for forming a graph of interest in the Cartesian coordinates for the x and y axes can be written as follows (Tian, Yuan, Hu, & Shi, 2019):: _ (1) Where ?? is the radius of the flower, ?? has a range from 0 to 2(, n is the number of flower petals.

To form a circle on the Cartesian coordinates for the x and y axes the equation is used: _ (2) where ?? is the radius of interest and ?? has a range from 0 to 2(. RESULT AND DISCUSSION Morning Glory Batik Morning Glory Batik is inspired by the many Datura Metel L. flowers found in Purwakarta (Figure 6). There are two colors of Datura Metel L. flowers that grow wild on cliffs or on the edge of the forest. White Datura Metel L. and purple Datura Metel L..

This flower called Datura Metel L. may be purple like gemstone or Datura Metel L. agate. Maybe on the contrary, purple agate is called Datura Metel L. because the color is like Datura Metel L.. The Datura Metel L. flower is actually not very attractive, like a trumpet but looks upward. Odorless and smaller in shape than leaves so it is less attractive to be an ornamental plant though. Only the colors purple and white look beautiful. / Figure 6.

The Datura Metel L. flower In the village where the weather is cold, these plants are easily found that grow wild or planted in the yard for herbal medicine or family medicinal plants. his plant is believed to relieve pain, for example teeth or pain by smearing it. But some people use Datura Metel L.

as a plant to anesthetize (Gente, Leman, & Anindita, 2015). When circumcision rituals are performed traditionally using sharp pieces of bamboo skin in Javanese called pring silatan without anesthetic. Of course, the pain is very deep to the crown and like piercing the solar plexus. This extreme pain makes restless and difficult to sleep.

At night when the pain does not go away. Efficacy of Datura Metel L. that can make someone anesthetized, by some people misused to a little forget the world with drunken fun. If intoxication with intoxication usually lasts between 1 or 2 hours, the Datura Metel L. intoxication can last for two or three days.

Getting drunk from the Datura Metel L. really hallucinates the brain with strange shadows. For example the poster image in front can be the face of people who curse us and make us afraid. Datura Metel L. flower extract can also be used as an insecticide, to kill mosquitoes that interfere and cause disease (Martini, Astriana, Yuliawati, Hestiningsih, & Purwantisari, 2018). In addition to the Datura Metel L. which inspired the morning glory batik motif, the Jatiluhur dam was built in a circle (Figure 3 (b)).

Jatiluhur Dam is also one of the ideas in making batik motifs. Ir Djuanda Dam (Jatiluhur), Purwakarta district, is a multifunctional artificial dam in West Java (Purwakarta, 2018). Including, becoming a favorite tourist attraction. Its beauty is no doubt. No wonder, if until now the area still has extraordinary charm for tourists.

Bendungan Waduk Jatiluhur mulai dibangun sejak tahun 1957 oleh kontraktor asal Prancis Compagnie française d'entreprise, dengan potensi air yang tersedia sebesar 12,9 miliar meter kubik per tahun dan merupakan waduk serbaguna pertama di Indonesia. Waduk Jatiluhur dibangun dengan membendung Sungai Citarum dengan luas daerah aliran sungai seluas 4.500 kilometer persegi.

The Jatiluhur Dam was built in 1957 by French contractor Compagnie Française d'entreprise, with a potential available water of 12.9 billion cubic meters per year and is the first multipurpose dam in Indonesia. Jatiluhur Dam was built by damming the Citarum River with a river basin area of ??4,500 square kilometers.

Inundation that occurred due to the construction of the Jatiluhur Dam submerged 14 villages with a population of 5,002 people. The residents were then partly moved to the area around the dam and the other part moved to Karawang Regency. Most of the population at that time worked as farmers The dam was built starting in 1957 with the laying of the first stone by the first Indonesian President Ir Soekarno and was inaugurated by President Soeharto on August 26, 1967. The construction of the Jatiluhur Dam dam cost USD 230 million.

The name of the dam dam is called Ir. H. Djuanda due to commemorate his services in fighting for the financing of the construction of the Jatiluhur Dam. He is the last Prime Minister of the Republic of Indonesia and led the cabinet of Karya (1957-1959) together with Ir. Sedijatmo is determined to fight for the realization of the Jatiluhur project in the Indonesian Government and international forums.

As the manager of the artificial dam, Perat Jasa Tirta (PJT) II Jatiluhur, transformed the Jatiluhur Dam, from what was originally only for water reserves, has now become one of the leading tourist attractions (Okezone, 2020). The idea begins by illustrating the Datura Metel L. flower in the middle of the Jatiluhur dam, so the morning glory motif is obtained, the flower in the middle and surrounded by a circle symbolizing the Jatiluhur dam and the water flow in the Jatiluhur dam is symbolized by small circles around the circle.

Table 2 is a pseudocode of graphics mathematics morning glory batik with circle outer, used equation (1) and (2). Table 2. Preudocode flower motif Pseudocode flower motif _ _1 _procedure A _ _2 _ a(2.5 _ _3 _ n (6 _ _4 _ for i (1 to 360 do _ _5 _ t(i)(i*pi/180 _ _6 _ x(i) = a*cos(n.t(i))*cos(t(i)); _ _7 _ y(i) = a*cos(n.t(i))*sin(t(i)); _ _8 _ x1(i) = 0.3 cos(t(i)); make circle in flower r=0.3 _ _9 _ y1(i) = 0.3

sin(t(i)); _ _10 _ x2(i) = 3 cos(t(i)); %make circle outside flower r=3 _ _11 _ y2(i) = 3

sin(t(i)); _ _12 _ x3(i) = 5 cos(t(i)); make circle outer flower r=5 _ _13 _ y3(i) = 5 sin(t(i)); _ _14 _ end for angle (dir*7.756 _ _15 _ plot(x,y,x1,y1,x2,y2,x3,y3) _ _16 _ for i (1 to 360 do _ _17 _ if mod(i,10)==0 _ _18 _ make line from circle r=3 to r=5 _ _17 _ end _ _18 _ end for _ _ Figure 7 (a) is a batik morning glory motif inspired by Datura Metel L. and jatiluhur dams, and Figure 7 (b) is a batik morning glory result. / / (b) Figure 7.

(a) Morning Glory from graphics mathematics (b) Batik design morning glory Batik embun jatiluhur Dew is a water vapor which undergoes a process in condensation-the process of changing gas into liquid. Dew usually appears in the morning, between the window glass or behind a leaf. According to the Indonesian dictionary dew is defined as dots of water that fall from the air at night.

In general, dew is water dots attached to the leaves and grasses that are often found in the morning or before the sun's heat on the leaves (Pendidikan, 2020). In this case all day things absorb heat from the sun, on the contrary at night things lose heat. When objects near the ground cool down, the temperature of the surrounding air also decreases. Cooler air can't hold as much moisture as warmer air.

The process of dew is caused by differences in air temperature. If the temperature gets colder, the air will eventually reach the dew point. Dew point is the temperature when the air is still able to hold as much moisture as possible. If the temperature gets colder, some water vapor will condense on the surface of nearby objects, for example on the leaves of plants.

Dew forms well on a clear, calm night. Dew also forms well when humidity is high, on the contrary when the sky is cloudy objects cool longer because clouds re-radiate heat to the earth. Which when the wind blows, the air needs more time to get cold near the dew point.

In areas where temperatures can reach minus below zero degrees Celsius, dew can be found in the form of ice crystals. This dew is called frost or white dew. If a lot of dew will gather and drip into dew drops. This dewdrop is the idea of ??forming the Jatiluhur dew batik motif. because in the Jatiluhur reservoir in the morning when the air reaches the dew point there are many dew drops on the leaves of the trees.

Table 3 is a pseudocode of graphics turtle dew drops (embun) jatilluhur batik. Table 3. Turtle graphics embun jatiluhur Pseudocode Turtle graphics embun jatiluhur _ _1 _procedure A _ _2 _ make dew drops _ _3 _ copy dew drops 3 times _ _4 _ rotate each dew drops pi/2 _ _5 _ translate dew drops _ _6 _ make little dew drops _ _7 _ copy little dew drops 3 times _ _8 _ rotate each little dew drops pi/2 _ _9 _ make circle centre _ _9 _

make ornamental line _ _10 _ copy ornamental line 3 times _ _11 _ rotate each ornamental line pi/2 _ _12 _ make little circle _ _13 _ copy ornamental line 3 times _ _14 _ rotate each ornamental line pi/2 _ _15 _end procedure _ _ Figure 7 (a) is the motif of jatiluhur dew batik results from the turtle graphic, Figure 7 (b) is the motif of jatiluhur dew batik after becoming batik cloth.

In Figure 8 (a) the Jatiluhur dew batik motif is rotated 45 degrees so that it can be used for different batik designs. Figure 8 (b) is the result of jatiluhur dew batik motif on batik cloth. Once combined with the morning glory batik motif, the dew jatiluhur batik motif will look like Figure 4 (b) and Figure 4 (c).

/ / (b) Figure 7 (a) embun jatiluhur from graphics mathematics (b) Batik design embun jatiluhur // (b) Figure 8 (a) embun jatiluhur from graphics mathematics (b) Batik design embun jatiluhur CONCLUSION AND SUGGESTIONS Batik Purwakarta which is a new batik survey results and interviews can be made in digital form with the help of mathematical graphs and turtle charts, so it is expected that the process of making Purwakarta batik products can be more efficient when making basic motifs.

With the results of digital motifs, the process of duplicating and storing data becomes easier. In the next research it is hoped that other batik motifs can be digitized with the help of mathematical graphs and turtle charts. ACKNOWLEDGEMENT Thank you so much for funding support that makes this research possible, to Direktorat Riset dan Pengabdian Masyarakat, Direktorat Jenderal Penguatan Riset dan Pengembangan Kementerian Riset, Teknologi, dan Pendidikan Tinggi in accordance with research contract of the year 2020 and thank you for facilities and support to Universitas Kristen Maranatha.

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