*Research Article*

# Fossil Texture Mapping With Computeriation Techniques As A Tool In Paleontology With Pheomelanin Pigment Method

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**Abstract** - Fossils are a form of living things or microorganisms in the past that have been buried in the soil or water for millions of years, a method or branch of science is needed to identify these fossils which are commonly used to determine the nature and way of life of humans in the past to improve their life. In the future, the science studies this field is called paleontology, which is a branch of the study of fossils and living things with the aim of extracting useful information useful in other fields such as geology, mining and marine. One of the important functions of paleontology is how we can reconstruct the size and type of living things based on data from bones obtained from excavations, the conventional way is that a palentologist will estimate the types of living things based on bone shape of the land area where the fossil is found, this will not be difficult if the fossils are found in intact conditions or excavated in the upper soil where the fossil conditions are generally clearly visible, but this is very different if the fossils found in damaged condition aren't intact or in petrified conditions making it difficult to in identification, so that estimates of the type of fossil plants or living things unidentify to read, the researchers previously tried to combine fossil reading and mapping techniques with the help of computer vision techniques, where an identification process is a computer capable of estimating and reading the type of fossil and displaying it in a visual form, the form shown is usually the blood flow of the connective tissue and the hair or hair of the animal, technology has a high accuracy and by reading a network of pigment or melanin in these animals, the melanin color in the fossil becomes a reference where the fossil lived and the type of carnivore or herbivore, this melanin color serves as an additional tool so that a pelentologist can use it as a recommendation tool to identify and read an object correctly with predictability and high accuracy.

**Keywords:** Paleontology, Mapping, Fossils, Computer vision

## 1. Introduction

A fossil originating from animals and plants buried in the ground for millions of years will certainly be difficult to identify, the excavation process will continue if the shape and size of the fossil hasn't been found completely, the excavation process sometimes experiences obstacles that are influenced by the environment which causes fossils become damaged and difficult to identify, but in conditions of snow or ice some fossils found in an intact condition and in good condition found in the form of muscle or flesh of the fossil animal, if the fossil condition isn't intact and damaged, the identification process will be done manually by bringing some samples of ancient animal fossils and carrying out the identification process gradually and takes a long time or by re-digging close to the area where the fossil is found hoping to find fragments or shales the same fossil. A computer-assisted mapping process on a fossil is as a tool or reference and doesn't replace the task of a paleontologist, a computer equipped with computer vision algorithms able to help reconstruct the shape and type of fossil

Paleontology is currently a very important branch of science that studies the cycles and life of living things in the past, this branch of science is able to provide a clear picture and information about the state of natural structure and habitat, no wonder a fossil finding is well done in the excavation process sometimes discovered by paleontologists and can be used as input and reference for other branches of science. Currently, paleontology continues to improve and conduct research on how to improve a process and excavation activities to obtain information from an object or fossil.

Accuracy of information becomes a necessity that can't be negotiated anymore, paleontologists no longer use manual excavation methods and processes but aid technology and other branches of science such as the field of computers, as we know the branch of computer science is growing rapidly which affects change and business processes from other branches of science such as marine, fisheries, military, transportation and medicine, computer engineering is able to process data and provide recommendations for new images of how humans work in stages and in detail, for example the field of paleontology provides an overview of how an excavation process is take on a fossil then analyzed to get the initial shape of the fossil, this process requires a long time and is very detailed, this situation also depends on whether the fossils are found intact or not and the conditions of the fossil habitat are found, in addition to manual excavations, paleontologists also use a computer that is used to analyze a structure of

bone shape and size, at This computer method uses a pheomelanin pigment technique, a technique for obtaining and tracing fossil forms with the help of color pigments

## 2. Study literature

Paleontology is now conducting an innovation and transforming towards a more advanced one, namely using a change in melanin in fossils that able to used for distinguish types of fossils and specimens when these fossils are alive, this case has been tested on two dinosaur fossils by comparing a dark color in melanin and The bright color attached to the fossil, the researchers believe by reading the changes in melanin in a fossil is able to reconstruct the changes and the age of the fossil, the color of melanin itself is greatly influenced by camouflage those influenced by an ultraviolet glow where it provides information on the types of species [1].

A color change contained in a fossil will provide a picture of the reconstruction of life in the past and be able to resemble earth life in the past, some examples of the description of a dinosaur fossil will be identified by paying attention to changes in melanin and comparing it with reptile life today, at each process. Excavation of fossils will always be followed by a process of color detection of animal fossils, be it invertebrates or vertebrates that lived about 10 million years ago, some examples of the structure of melanin can be found in fossils of snakes, elephants and dinosaurs[2,8]fdhc.

Color change in animal fossils is generally influenced by a chemical change derived from the color that generally occurs in an animal fossil which is influenced by the type of plant eaten by the animal, in particular the structure of melanin is able to provide an image of the structure of an animal muscle [3].

In some previous studies it can be assumed that a predatory animal can have a darker or lighter color of melanin, this is influenced by the habitat the animal lives in, but predators as the main predators sometimes live in forest habitats that are n't too dense and there are some differences for predators. those that live in the forest or in the savanah area, for example deer that live in savanahs will naturally have the same skin color as their natural habitat which functions to camouflage themselves from predators [4].

The correlation of relationships or animal habitats is sometimes inappropriate, for example animals that live in snowy areas, for example in bird species and vice versa, birds that live in desert areas have darker colors, while birds that live near the sea or shoreline have a more light color. Obviously, this difference is greatly influenced by several factors such as habitat for hiding and the hunting process in search of food [5]

the process of matching and reading on a melanin in a fossil caused by a change in bacteria, the data of these changes are able to provide information about the ecology of the animal's life, which means that the animal has evolved, several studies have been developed and explain how melanin provides information and characteristics of a fossil, Some of the previous methods used to read fossil melanin are Time-of-flight secondary ion mass spectrometry (ToF-SIMS), scanning electron microscope (SEM) and using synchrotron X-ray techniques, these three methods are used to read stored natural data there is in the color of the fossil and the structure that forms it [6].

The computerized method implemented in the field of Peleontology is an advancement in itself where this method is able to describe a morphological life process of fossils based on the image processing detection process on a fossil image, the data taken can be in the form of fossil residue data, which produces a liquid black and red residue. the usual red color indicates a condition of soft tissue in the fossil, in a test with the Synchotron Rapid Scanning X-ray method Fluorescence imaging can find chemical Zn which is usually found in the structure of the animal's fur or hair, this method provides input and information valuable on the fossil specimens under study [7].

## 3. Method research

In this testing method, the testing system or step begins with a fossil image data taken at the excavation area or site, the field image data will be scenario in the rock area and the fossil measurement process will be carried out digitally, the raw data can be analyzed and sent directly to Lab or the color segmentation process is carried out, an application that is equipped with an image processing method will carry out the analysis and identification process of the fossil, with the help of a computer the object from the fossil can be measured and has high precision, the stages of the measurement method with the melanin method are to differentiate an original object that can't be seen with the naked eye because the fossil shape is the same as its original color and habitat, this process is to minimize errors from reading the fossil data, the stages of the fossil identification process are as follows:

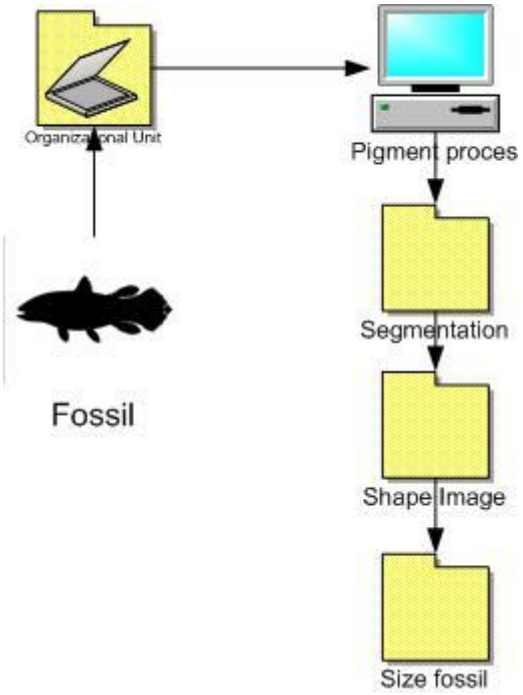


**Figure 1.1 Melanin identification method by image processing**

In the picture above is the melanin method derived by computer techniques with image processing, this method converts the color change data from melanin into R, G, B colors, The stages are as follows:

• Image of fossils

An image fossil found in an area of sediment or rock, the condition of the fossil in intact condition is easy to identify and record, while damaged fossils need to use by image processing techniques, this process is able to read the data and provide recommendation images of the intact fossil form.

• Process pigment

In this section a process of reading data from the fossil is carried out based on color gradations, the shape of the fossil which is the same as the surrounding object will be difficult to distinguish and measure, this segregation system will be difficult to use with naked eye because the object being read is still fairly the same, this process is read using an image processing technique that converts the pigment color into a data in RGB format so that readable by the system which will display the skeletal and muscle tissue structure of the fossil.

• Segmentation

This process is part of a color segmentation process in which a read fossil image will be analyzed by a computer based on several RGB color compositions so that the fossil object and the surrounding environment are clearly visible and become a complete fossil.

• Shape image

The computer can display the complete form of the fossil, the background color of the original object unseen, the shape of the fossil begins to form and by peleontologists it useable for recommendation about the name of the fossil and its habitat and the nature of the fossil.

• fossil size

In this section, the final process of the color conversion system using the melanin method of fossil forms will clearly be identified and the measurement process will be carried out using a computer with high accuracy.

## 4. Implementation

In this implementation, the system testing trial process will use some sample data taken randomly from the internet, the data is in the form of fossil images that will be reconstructed by a computer system using data-reading techniques, a color conversion process regarding the path of the fossil size bone and possible species herbivores or carnivores that are seen based on the texture of the teeth and bones found.

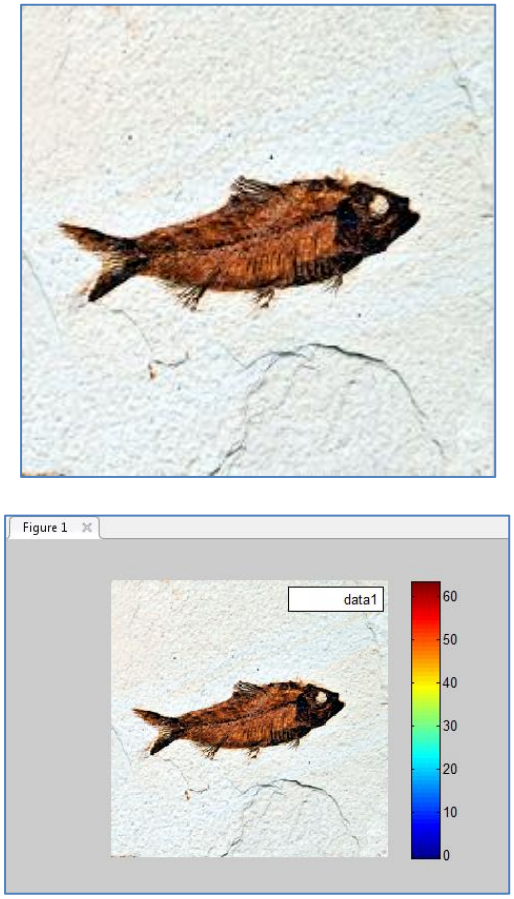


**Figure 1.2 picture of fossil fish**

Information :

In Figure 1.2 above is sample data taken randomly on a fish fossil, some fossils are stored or buried in rock soil, the initial stages of these fossils will usually be a careful excavation process so that the fossil isn't damaged, an identification process Fossil measurement becomes an information about the type and name of the fossil, in rocks that have the same color as the fossil it will be difficult to do because of the same shape and color and can also be caused by some form of fossils that are not intact.

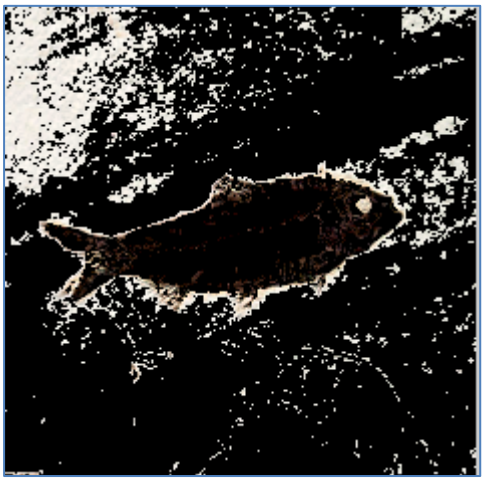

**Figure 1.3 Image enhancement of fossil images**

**Information :**

In the picture above is a process of enhancement of the fossil image, the sharpening process is carried out to remove noise from the rock image so that the original shape of the fossil readable and shape is complete and isn't

affected by surrounding data, this process has an important function so that at the time the process of measuring computer data will display high accuracy values.

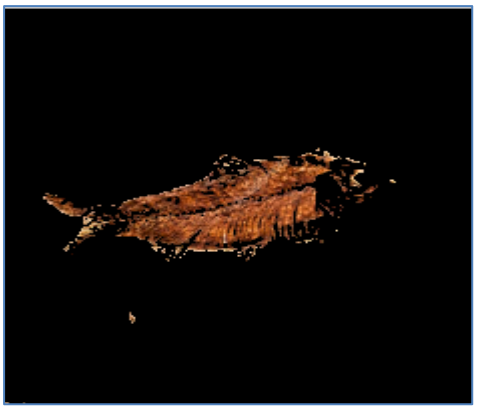

**Figure 1.4 estimated fish size shape**

**Information:**

Figure 1.4 is a process called data normalization results from images of fossilized fish, in this process the complete fossil form is visible and the computerized process has eliminated noise data so that the data can be used by palentology to determine and read the types of fossils from this information able to process for analyzing the nature of the animal and how the ecosystem is.


Figure 1.5 computerized measurements of fossil sizes

**Information :**

In Figure 1.5 the final process of data from fish shapes and fossils can be identified clearly, the computer will automatically provide an estimated measurement with the fossil size of 152.90 cm, this data can be used by peleontologists to determine and read the age of the fish and their habitat and kind of fossil.

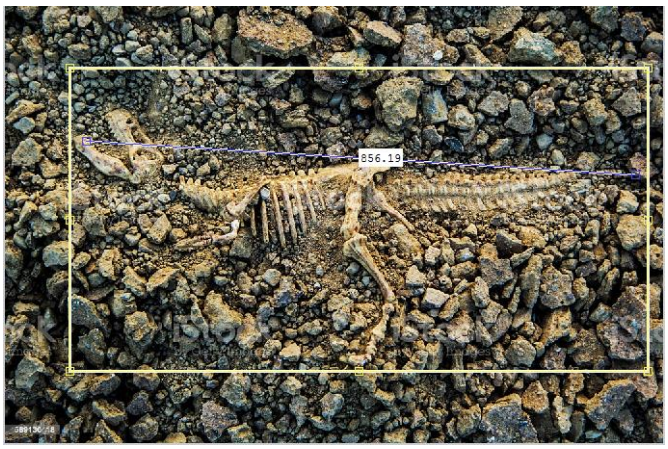

Figure 1.5 measurements of ancient fossils

**Information:**

In the picture above the author uses a sample data taken from https://www.istockphoto.com which will be used as sample data, on that data the computer performs the test estimation process, on the image the computer displays the estimated measurement with a result of 856.19 cm.

## 5. Conclusion

From the experimental results it can be concluded that computerized techniques can help a paleontologist to read and record estimates of the size of the fossil based on the initial textures of the fossil, computer vision techniques are able to sharpen an object from the fossil in detail without being affected by surrounding objects that cannot be seen with the naked eye. The important factor in determining the size of this fossil is from the fossil texture and the second is the pigment or color process, in computer and image processing the color measurement component is also called RGB or with a composition of Red, Green, Blue, this process is useful for color identification. In order to distinguish the color of the fossil from the surrounding rock with the stages of reading data, sharpening the image and finally removing noise, from the three stages the computer then performs the measurement process of the fossil which can be displayed in visual form, this computerized technique doesn't replace a paleontologist but rather as a useful tool for reading and displaying the size of a fossil.

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