

Design And Development Of Karo Traditional Music Instrument Recognition Application Based On Digital Image Using Convolutional Neural Network Method

Rizki Otkavinus Tarigan ^{1*}, Achmad Fauzi ²

^{1,2} Informatics Engineering, STMIK Kaputama
rizkisibero@gmail.com¹, fauzie.kaputama@gmail.com²

Abstract

In this modern era, multimedia technology has role important in various field like education, health, and publications. Thesis This focused on development application introduction tool music traditional Karo tribe based digital image use Convolutional Neural Network (CNN) method. Karo music has characteristic typical unique and important for culture of North Sumatra. Study This use method Squeezenet and MobileNetV2 for compare accuracy in introduction object tool music Karo tribe. The Convolutional Neural Network (CNN) method is used in the introduction process. Steps covers convolution, function Activation ReLU, pooling, layers connected full, and the output layer with function Activation Soft max. Image data tool music Karo tribe gathered from Google Images. System This own steps like preprocessing image, model training with CNN method, and analysis results training. Research results This give comparison accuracy between method Squeezenet and MobileNetV2 in recognize tool music Karo tribe. Supporting data used in analysis, especially image tool music obtained Karo tribe from Google Images, with structured design and implementation of CNN, applications This succeed recognize type tool music with level good accuracy.

Keywords: *Application_Introduction, Traditional_Musical_Tools, Suku_Karo, Citra_Digital, CNN*

1. Introduction

This modern era many multimedia technologies used in various field like field education, health, publications or advertising, etc. Multimedia is utilization computer in displays combining information text, graphics, and videos for users can navigate, interact, create as well as communicate with computers in an era of increasing globalization advanced This is development in matter technology information and communication very fast. Technology Computers are also developing very rapidly regarding hardware as well the software that is used in a manner integrated For utilized in convey information as well as knowledge in visual form [1] . Karo music has characteristics and uniqueness alone when compared to with music ethnic in Batak tribe in North Sumatra. Inherited dive hundreds years, Karo music is still exist until day This though get challenge For guard its sustainability in the midst of changing times fast. By general Karo music consists from sarunei (tool music inflatable), kulcapi (tool music petik), the parent drum and the child drum are shaped tube small elongated, and two gongs (large gong and small gong) Ensemble That combined with a the singer mentioned perko-kol, bring stories about What of course, appropriate with traditional event theme. Study This will make system for recognize object tool music Karo tribe with use Python 3.7.8 application. System the will compare between two method used For do introduction object tool music Karo tribe with use method Convolutional Neural Networks. System created later for know mark accuracy from detection introduction tool music Karo tribe with use method K-Fold Cross Validation and concluded results from second which method with results good accuracy in recognize object tool music Karo tribe. Convolutional Neural Network (CNN) methods include in kind of deep learning because depth the network. Deep learning is branch from machine learning that can teach computer For do work appropriately human, like computer can Study from the training process [2]

2. Research Methods

2.1 Karonese

Karo tribe is inhabited tribe plains karo high, North Sumatra, Indonesia. Ethnic group this one ethnic group the largest in North Sumatra. Tribe name This made as one Name district in their territory shut up that is Karo District or more known with Tanah Karo [3] .

2.2 Musical Instruments Traditional

Musical instrument traditional is tool music typical for those areas throughout Indonesia. the kind Lots once, because almost every area own tool music alone. Musical instrument traditional become identity something area in Indonesia. Musical instrument traditional can grouped become a number of types, including tools music pick, tool music blow, tool music hit, tool music swipe. Musical instrument pick Indonesian traditional, among others: Siter, Leko Boko, Sapek. Musical instrument swipe Indonesian traditional, among others: Rebab, Arababu, Tehyan. Musical instrument blow Indonesian traditional, among others: Banjar Trumpets, Serangko, Saluang. Musical instrument o'clock Indonesian traditional, among others: Kolintang, Kendang, Ketipung [4] .

2.3 Digital Image

Image is representation object two dimensions from the visual world, concerns various type discipline encompassing science art, human vision, astronomy, engineering, and so on. Is something gathering pixels or shaped colored dots two dimensions [5] . Image is visual picture of something object or a number of object. Of course just exists image can various, of photos of people, pictures, results x-rays, to image satellite. According to Abdul Kadir, the types of images are divided become three type that is binary image (image monochrome), image scale grayscale (grayscale), and image color. A digital image can represent by a matrix that consists of M columns N rows, where intersection between columns and rows are called pixels (pixels = picture element), ie element smallest from a image. Pixel have two parameters, viz coordinates and intensity or color. The value contained in the coordinates (x,y) is $f(x,y)$, ie big intensity or color from pixels in dots the [6] .

2.4 Pixels

Digital image can obtained with a number of way, First method with photograph through Photo and second with take picture with using printer scanners. In all formats deep digital image bitmap shape describes the same way although different source original and pay attention to the main parameters used describe digital image, with techniques and standards compress. Image can with grayscale or color. Appearance image on a computer monitor Lots form dot, dot, dot small. There are dots small on the elements images are called pixels. There are a number horizontal line fine pixel numbers nor a vertical line. Different pixels okay So different brightness /brightness or intensity [7] .

2.5 Resolution

Resolution image describe detail from a image, increasingly tall resolution image so the more tall sharpness. In term resolution digital image image often stated with many pixels from something image, for example : image with size 256x256 represents 256 pixels in the column and 256 pixels in the row [8] .

2.6 Intelligence Artificial

Intelligence artificial or Artificial intelligence is something simulation from intelligence modeled human inside machine and programmed to be capable think like human. Intelligence artificial is something technology that requires data for made knowledge so that intelligence is created can become more Good Again so that Can Keep going grow and learn from previous error [9] . Artificial Intelligence (AI) is part from knowledge learning computer technique so that the machine (computer) can copy work done man with capable performance rival him. AI aims for know or modeling thought processes man and design machine so that Can imitate behavior man [10] .

2.7 Deep Learning

Deep Learning is part from intelligence artificial and machine learning which is development of a multiple layer neural network to give accuracy task like detection object, introduction sound, translation language and others. Deep Learning is different from traditional machine learning techniques, due to deep learning automatic do representation from data like pictures, videos or text without introduce rule code or human domain knowledge [11] .

2.8 Convolutional Neural Network (CNN) Method

Convolutional Neural Network (CNN) included in kind of deep learning because depth the network. Deep learning is branch from machine learning that can teach computer For do work properly human, like computer can Study from the training process [2] . The CNN structure consists from input, extraction process features, classification processes and outputs. Extraction process in CNN consists from a number of layer hidden or hidden layers, ie layer convolution, function activation (ReLU), and pooling. CNNs work in a manner hierarchy, so the output is on the layer convolution First used as input to the layer convolution next. In the classification process consists of fully-connected and functional activation (softmax) which outputs form results classification.

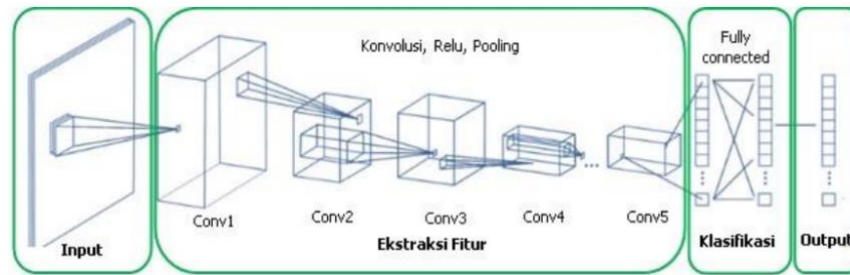


Fig.1: CNN Structure

2.9 SqueezeNet

SqueezeNet is architecture network nerve clone that uses CNN. SqueezeNet able reach accuracy AlexNet (winner of ImageNet classification task 2012) with 50 times more parameters A little as well as time training 2 times more fast. SqueezeNet Lots change arrangement 3x3 convolution with 1x1 and more filters A little For shrink size of activation map (squeeze). Method reduction dimensions This first introduced in the Network In Network model [12] .

2.10 MobileNetV2

MobileNetV2 is one architecture from the usual convolutional neural network methodology also known as CNN stands for which can used For overcome need will be excessive computing resources or need computing tall [13] .

2.11 Transfer Learning

Transfer Learning is method or technique that uses a pre-trained model (already trained to a dataset) for finish other similar problems with method use it as a starting point, then modify and update parameters so that in accordance with case datasets new problem. Example of Transfer Learning ie using a trained pre-trained model For recognize car, then the model used For recognize truck [14] .

2.12 Data augmentation

Data augmentation is a possible strategy practitioner For in a manner significant increase diversity and amount available data for the training model, without truly collect new data. Data augmentation techniques such as cropping, padding, iteration and general horizontal flipping used for practice large neural network. However, in part big approach used in training neural network only use type augmentation basic. Temporary architecture neural networks have investigated in a manner deep [14] .

2.13 Python

Python is Language freeware programming or device free in the real sense, no There is limitation in copying or distribute it. Complete with source code, debugger and profiler, interface contained therein For service interface, function system, GUI (interface user graphics), and the database. Python can used in a number of system operation, like most UNIX systems, PCs (DOS, Windows, OS/2), Macintosh, and others. At most system operation linux, language programming This become standardization For included in package distribution [15] .

3. Results and Discussion

To assist in the preparation of this research, it is necessary to have a framework with clear stages. This framework is the steps that will be taken in solving the problems that will be discussed.

3.1 Stages Study

To assist in the preparation of this research, it is necessary to have a framework with clear stages. This framework is the steps that will be taken in solving the problem that will be discussed. The research framework used is as shown in the image below.

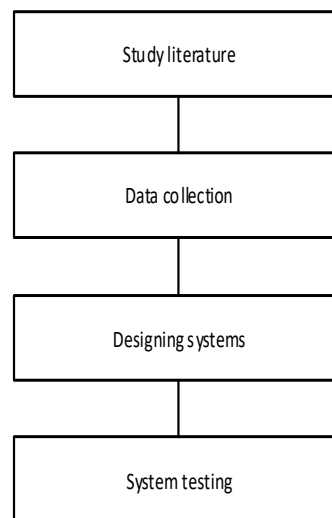


Fig.2: Stages Study

Based on framework Work research that has pictured above, then can outlined discussion of each stage in study is as following :

1. Learn Literature
At stage This done search foundations theory obtained from various books and also the internet for complete treasury concepts and theories, so own good and appropriate foundation and knowledge. _
2. Data Collection
Collecting data by using or collecting written sources, by reading, studying and recording important things sourced from books, journals and the internet related to the problem being discussed in order to obtain a theoretical picture.
3. Designing System
On Stage This done designing system with use Python 3.7.8 software.
4. Testing System
At stage This existing applications designed previously has done and done stages testing system is There is error or damage to existing systemsdesigned.

3.2 Supporting Data

In the classification process a data, of course previous data is needed become supporters for done analysis calculation A method, so later can obtained a alternative best based on existing data determined. In system introduction tool music traditional Karo tribe based digital image with convolutional neural network method, the data used that is c image from tool music karo tribe that has collected with method taken from google images.

3.3 Design System

In designing something system introduction tool music traditional based Karo tribe digital image with convolutional neural network method, author use method Squeezenet and MobilenetV2 for know type from tool music with give comparison accuracy from second method the. As for the concept modeling the system will created by the author For designing something system introduction tool music traditional based Karo tribe digital image with convolutional neural network method.

3.4 Flowchart Design

As for flowcart algorithm design get up system introduction tool music traditional Karo tribe based digital image with convolutional neural network method.

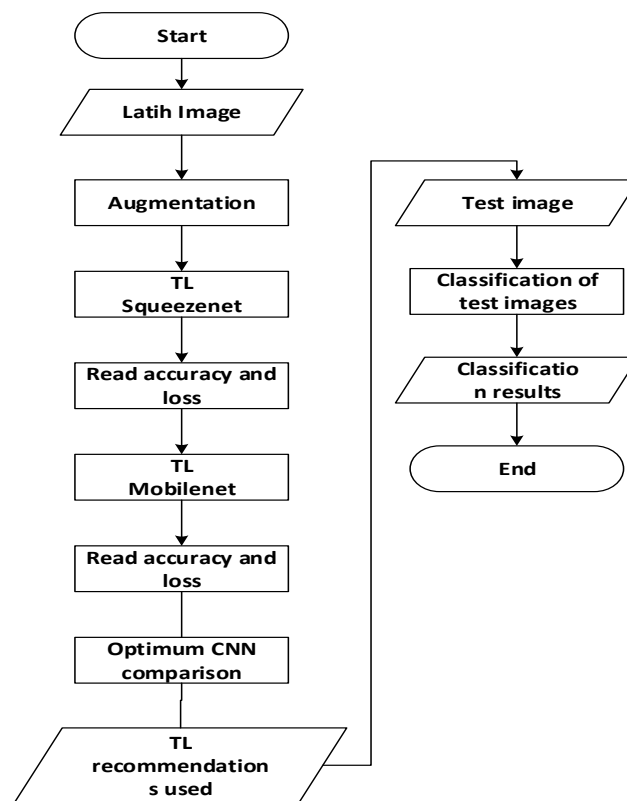


Fig.1: System Flowchart

In the picture above, the workflow of the recognition system can be explained tool music traditional Karo tribe . Starting by inputting training image dat, then processing up to rescaling, then conduct circa data training train used. Then after finished conduct training data for method squeezenet, then next with read accuracy and the resulting loss from the training data. Next, training data is carried out for mobilenetv2 method, then read accuracy and loss obtained from the training. Then observed from results from second method the, with see amount processing time along with accuracy and loss data from second method the. Then given conclusion from second method used. Furthermore done introduction tool music with use One test image and done classification test image for know type tool music based on used and finished test image.

4. Conclusion

Study This designing something system introduction tool music traditional the Karo tribe uses Convolutional Neural Network (CNN) method with compare accuracy between method Squeezenet and MobilenetV2. The steps are explained covers image data collection tool music, as well planning system with using Python 3.7.8. Besides That, there is also a section about the supporting data used in analysis, esp image tool music obtained by the Karo tribe from Google Images.

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