

A Synopsis on

Real Time Bare Skinned Image Filtering Using CNN

Submitted in partial fulfillment of the requirements
of the degree of

Bachelor of Engineering

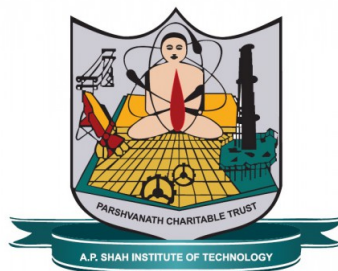
in

Computers

by

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CERTIFICATE

This is to certify that the project Synopsis entitled “***Title of project***” Submitted by “***Tina Shah (16102019)***” for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Computers*** to the University of Mumbai, is a bonafide work carried out during academic year 2018-2019

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Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Image classification is critical and significant research problems in computer vision applications such as facial expression classification, satellite image classification, and plant classification based on images. This project proposes the image classification model applied for identifying the display of daunting pictures on the internet. The proposed model uses Convolutional Neural Network (CNN) to identify these images and filter them through different blocks of the network, so that it can be classified accurately. The model works on TensorFlow a user friendly platform, which provides different high levelled APIs (in Keras) which are used to build any basic model. It also permits us to add our own libraries. The input data for the model are images we collected online through various resources. Our model will work as an extension to the web browser and will work on all websites when activated. The output of the proposed model is blurring the images and deactivating the links. This means that it will scan the entire web page and find all the daunting images present on that page. Then we will blur those images before they are loaded and the children could see them. Apart from it, we will also disable any clickable links present. This ensures protection from disturbing images and links, to the children.

Introduction

Skin colour detection has been used in numerous computer vision applications like face detection, nudity recognition, hand gesture detection and person identification. Skin colour detection is often used as a preliminary step in these applications. Colour is the most robust and useful clue for skin detection and also allows fast processing of the skin patterns. Other cues like shape and geometry can be used to build accurate face detection systems. Skin colour detection is a challenging task as the skin colour in an image is sensitive to various factors like illumination, camera characteristics, ethnicity, individual characteristics such as age, sex and body parts and other factors like makeup, hairstyle and glasses. All these factors affect appearance of skin colour. Another problem is that there is a significant overlap between the skin and non-skin pixels. Most of the skin detection techniques discussed in literature are used as a preprocessor for face detection and tracking systems. However when these techniques are used in real-time, it is crucial to follow time deadlines and memory constraints. Sometimes, accuracy may need to be sacrificed when the skin detection strategy is used only as a preprocessing step to face detection, particularly in real time applications. In this study we have focused on the problem of developing an accurate and robust model for the human skin.

Objectives

The model will offer child proof surfing on the internet without parent intervention. So that parents do not have to worry about their children coming across nude images at such an early age without knowing the actual meaning of it. That is it will monitor every page and filter all the images, hiding their details from the children and disabling their activation upon any click. Even if the people in the image is not completely nude, may it be just the upper or lower half of the person's body; thus ensuring guaranteed protection.

Literature Review

The Convolutional Neural Network (CNN) classifies the image regions as a collection of either skin or non-skin regions, it also classifies it based on the curves and edges it encounters in the image. Various approaches to skin modelling are used in the literature. Here we give a brief review of the neural network models for skin detection. The approach presented by Lee et al. employed a learning scheme based on the skin colour distribution of the image, using a neural network to learn and classify whether the input image contains skin exposure. Earlier work on nude identification focused on human skin detection, in which the idea is that greater amounts of detected skin would lead to higher probabilities of nudity within the image, hence characterizing the content as nude. Nevertheless, these approaches suffer with a high rate of false positives, especially in the context of beaches or practice of aquatic sports. Apart from this the model proposed by Brown et al. contained two types of skin models used in the literature (Brown et al., 2001) viz., symmetric and asymmetric. Symmetric model uses a single classifier for both the classes whereas asymmetric model uses two separate classifiers for skin and non-skin pixels that are separately trained using respective features. Advantage of asymmetric skin classifier is that it increases the distances in certain skin related features between a positive (skin) and a negative (non-skin) image, with disadvantage of increased time complexity for training two classifiers. The neural classifiers used in the literature either uses a symmetric model with single neuron in the output layer or uses two separate neural networks (asymmetric model) for each of the skin and non-skin classes. The novelty of our approach is that it has multiple convolutional that is hidden layer working on only skin coloured images containing humans. Thus by using a single CNN classifier we have improved the separability between these two classes, eliminating additional time complexity that is needed in asymmetric classifier.

Problem Definition

The main problem faced with CNN is training the model with the images it needs to identify. So in this study we train the model only on one type of image, which contains of exposed skin of humans, using a classifier. The classifier will differentiate the image based on its type. An image classified as positive by the classifier equals a nude or daunting image. Any other type of image will be filtered right through it. Thus this classifier makes the work easier, as we don't have to make two different classifiers for identification and filtering.

Proposed System Architecture/Working

Convolution Neural Network(CNN) is one of the main technology for image recognition, images classifications.CNN image classifications takes an input image, process it and classify it under certain categories.Our main aim is to blur the dauting images and disable the link so that children do not get redirected to some irrelevant content which they are not suppose to see in such small age.We will be first training the cnn model(VGG16/VGG19) on only 1 class of bare skinned images,while predicting images it will give output 1 if it finds bare images and value greater than 1 if any other kind of image is found.Once the model is trained with good accuracy,chrome extension will be created for the same,which will capture all the images on the websites and if finds the dauting image,it will blur the image and also automatically disable the link so the children do not get redirected to some other page which they should not visit.Hence this model would work as an excellent child proof surfing on the internet without us monitoring their usage 24*7. Not only the child would not come across extreme pictures and videos at such an early age where their minds are growing and has the most grasping power. But it will also help the parents to not waste their time and worry about their child getting exposed to nudity at such an early age.

Flow Of Models

First step is the classification of images is done using Convolution neural network.Training will done only on 1 class i.e on dauting images.Tesing will be done for the same,so the we come to know how accurate the is prediction the output.Testing will have both kind of images i.e dauting images and the other may have any kind of images.Extension will be created just like other google extension,which will blur and disbale the images on the website.The user just need to download this google-chrome extension and all the other working will the done by extension automatically without prental control.This extension will work 24*7 and provides safe browsing on the internet to kids.

Use Case Diagram

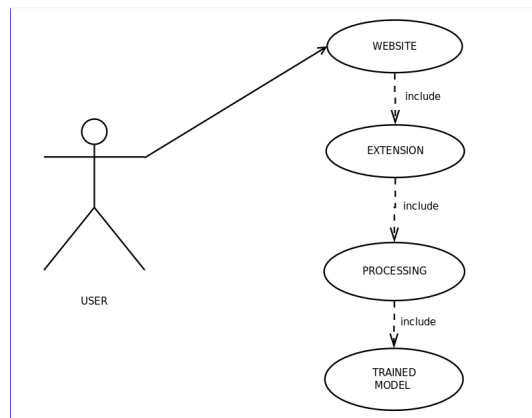


Figure 1: Intrusion Detection System

Models

The project is divided into 4 models which are as follows

Module 1: Classification of Images using CNN

In this module, training is done on the cnn model to identify the bare images and the other images. Here we are using just 1 class of bare images. Convolution neural networks have different models. Few of them are enlisted below:

- LeNet-5
- AlexNet
- VGG16 and VGG19
- Inception-v1 and Inception-v3 and Inception-v4
- ResNet-50
- Xception

This model proposes use of VGG16/VGG19 model. Training is basically done of approximately 25000 images dataset for more accurate and correct results

Module 2:Testing the trained model

Once we have trained the model on the bare skinned images,now we need to test the model whether the it is giving accurate output or not.We will be passing both 1 set of bare skinned images and other set will be any kind of images for example of cat,dog,humans etc.If the model find bare skinned image it will print 1 in the output if not than value will be greater the 1.

Module 3:Creating extension to blur the images

We will try to put trained model on the web browser itself so that it works on all the websites. Thus being said we will provide it in the form of an extension which when activated would work for all the websites you visit while it is activated. Our technology will still try to cover the maximum websites possible.The extension would work in Google Chrome as any other extension you may use or see. You will have to download and add it to the Google Chrome and give it permissions to scan the pages you visit while surfing on the internet.

Module 4:Disabling the link

Just blurring the image is not enough,as clicking on image may redirect to some other websites which may be children should not visit.So the extension which we have created will not only blur the image but also disable the link,which makes sure to the parents that their children are doing save browsing.Also this extension will work 24*7 without any parental control,they just need to download the extension.

Summary

The work presented in this report is related to Bare skinned image recognition.

- Bare skinned image classification using cnn
- Extension to blur the image and diable the link

References

- [1] 2017 9th International Conference on Knowledge and Systems Engineering(KSE) "Advertisement Image Classification Using Convolutional Neural Network"