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Journal Computer Technology

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The works must be unpublished and refer to topics of Data Management, Establishment of Computer Networks, Design of Database Systems, Software Design, Computer Science, Software, Computer Technology with Services, Business Process Outsourcing, Hardware and other topics related to Engineering and Technology.

Presentation of content

In volume seven, issue nineteen, as the first article we present, *Image recognition software geometry with Python and OpenCV*, by MAR-HERNÁNDEZ, Pedro Guillermo, IBARRA-ANGULO, Pedro Luis, GRIJALVA-ACUÑA, Juan Carlos and ABRIL-GARCÍA, José Humberto, with secondment at the Instituto Tecnológico de Hermosillo and Universidad de Sonora, as a second article we present, *Analysis of mobile applications for adults with autism spectrum disorder*, by PAREDES-XOCHIHUA, María Petra, with an appointment at Universidad Da Vinci, as a third article we present, *Development of a medical application as an integrative activity*, by MORA-LUMBRERAS, Marva Angélica, SÁNCHEZ-PÉREZ, Carolina Rocío, PORTILLA-FLORES, Alberto and SÁNCHEZ-SÁNCHEZ, Norma, with secondment at Universidad Autónoma de Tlaxcala, as fourth article we present, *Design and development of chatbot for the BITOO platform*, by PAREDES-XOCHIHUA, María Petra, SÁNCHEZ-JUÁREZ, Iván Rafael, PORTILLA-FLORES, Alberto and MORALES-ZAMORA, Vianney, with secondment Tecnológico Nacional de México Campus San Martín Texmelucan.

Content

Article **Journal Computer Technology**
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Image recognition software geometry with Python and OpenCV

Software de reconocimiento de imágenes geométricas con Python y OpenCV

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Abstract

The project aims to develop a software application using Python and various libraries for image processing and manipulation. The software used consists of Windows 10 Pro Education, Python 3.8.2, OpenCV 4.5.3, NumPy 1.22, Imutils 0.5.4, Pillow 9.4.0, Tkinter, and Visual Studio Code 1.75.1. The methodology is divided into four sprints. In the first sprint, the necessary dependencies, including OpenCV, NumPy, Imutils, Pillow, and Tkinter, were installed. The second sprint involved developing a command-line interface and integrating a live webcam video feature. In the third sprint, color detection was implemented by converting the image to black and white and applying filters to identify specific colors. Finally, the fourth sprint focused on developing the selection of geometric figures and colors. When a figure and color were selected, the software would identify and outline the corresponding object. This project utilized Python and various libraries to create an application for image processing and manipulation. The methodology followed a sprint-based approach to gradually develop different features and functionalities of the software.

Python, OpenCV, Numpy

Resumen

El proyecto tiene como objetivo desarrollar una aplicación de software utilizando Python y varias bibliotecas para el procesamiento y manipulación de imágenes. El software utilizado consiste en Windows 10 Pro Education, Python 3.8.2, OpenCV 4.5.3, NumPy 1.22, Imutils 0.5.4, Pillow 9.4.0, Tkinter y Visual Studio Code 1.75.1. La metodología se divide en cuatro sprints. En el primer sprint, se instalaron las dependencias necesarias, incluyendo OpenCV, NumPy, Imutils, Pillow y Tkinter. El segundo sprint involucró el desarrollo de una interfaz de línea de comandos y la integración de una función de video de cámara web en vivo. En el tercer sprint, la detección de color se implementó convirtiendo la imagen a blanco y negro y aplicando filtros para identificar colores específicos. Finalmente, el cuarto sprint se centró en desarrollar la selección de figuras geométricas y colores. Cuando se seleccionaba una figura y un color, el software identificaba y delineaba el objeto correspondiente. Este proyecto utilizó Python y varias bibliotecas para crear una aplicación para el procesamiento y manipulación de imágenes. La metodología siguió un enfoque basado en sprints para desarrollar gradualmente diferentes características y funcionalidades del software.

Python, OpenCV, Numpy

Citation: MAR-HERNÁNDEZ, Pedro Guillermo, IBARRA-ANGULO, Pedro Luis, GRIJALVA-ACUÑA, Juan Carlos and ABRIL-GARCÍA, José Humberto. Image recognition software geometry with Python and OpenCV. Journal Computer Technology. 2023. 7-19:1-9.

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Introduction

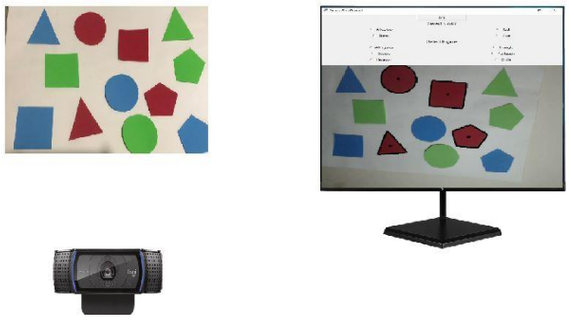

Figure 1 Diagram

Description of tools

Python was created in the late 1980s by Guido van Rossum at Stichting Mathematisch Centrum (CWI) in the Netherlands as a successor to the ABC programming language, capable of handling exceptions and interfacing with the Amoeba operating system. (Papercut Publications, 2022).

The language's name comes from its creator's fondness for British comedians Monty Python. Guido van Rossum is the main author of Python, and his continuing central role in deciding the direction of Python is recognized, referring to him as the Benevolent Dictator for Life (BDFL); however, on July 12, 2018, he declined from said position of honor without leaving a successor or successor and with a high-sounding statement. (Ortega, Faruque Sarker, & Washington, 2019)

OpenCV is an open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being an Apache 2 licensed product, OpenCV makes it easy for businesses to utilize and modify the code. (Howse & Minichino, 2023)

The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms.

These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 18 million. The library is used extensively in companies, research groups and by governmental bodies. (Lentin, 2015)

VSCode is a free source code editor made by Microsoft for Windows, Linux and macOS. (Uzayr, 2023) Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality. VSCode source code comes from Microsoft's free and open source software VSCode project released under the permissive Expat License, but the compiled binaries are freeware for any use. (Speight, 2021)

GitLab is a web-based DevOps lifecycle tool that provides a Git-repository manager providing wiki, issue-tracking and continuous integration / continuous deployment pipeline features, using an open-source license, developed by GitLab Inc (Evertse, 2019). The software was created by Ukrainians Dmitriy Zaporozhets and Valery Sizov. (Murph, 2020)

NumPy is a Python library used for working with arrays. (McKinney, 2017)

It also has functions for working in domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open-source project and you can use it freely. NumPy stands for Numerical Python. (Rajender, 2023)

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Imutils (Rosebrock, 2015) (timgates42, 2022) has a series of convenience functions to make basic image processing functions such as translation, rotation, resizing, skeletonization, displaying Matplotlib images, sorting contours, detecting edges, and much more easier with OpenCV.

The Python Imaging Library (Driscoll, 2021) or PIL, is an external library for the Python 2x programming language that allows images to be easily manipulated using high-level commands. (Pajankar, 2017)

The tkinter (Roseman, 2019) package ("Tk interface") is the standard Python interface to the Tcl/Tk GUI toolkit. Both Tk and tkinter are available on most Unix platforms, including macOS, as well as on Windows systems. (Moore, 2021)

Hardware and Software specificications

The hardware used in this project was:

- Intel(R) Core (TM) i5-10400F CPU @ 2.90GHz (12 CPUs), ~2.9GHz, 32 GB RAM, 64 bits.
- Logitech C920S Pro HD.

The software used in this project:

- Windows 10 Pro Education.
- Python 3.8.2.
- OpenCV 4.5.3.
- Numpy 1.22.
- Imutils 0.5.4.
- Pillow 9.4.0.
- Tkinter.
- Visual Studio Code version 1.75.1.

Methodology

Sprint 1

In the first sprint, the first thing that was done was to install the desired python version to start developing the software and install the necessary dependencies such as:

- OpenCV.
- Numpy.
- Imutils.
- Pillow.
- Tkinter.

Sprint 2

In the second sprint, a command line interface was developed to be able to program the desired actions from the buttons, a button was also programmed to be able to call the live webcam video.

Sprint 3

In the third sprint, color detection was developed, first we had to transform the image to black and white, followed by applying a filter with ranges of tones to identify the colors.

Sprint 4

In this fourth and final sprint, the selection of geometric figures and colors was developed, when selecting the button of a figure and the one of a color, only that object would be identified with a pointer and the outline of the selected object.

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Results

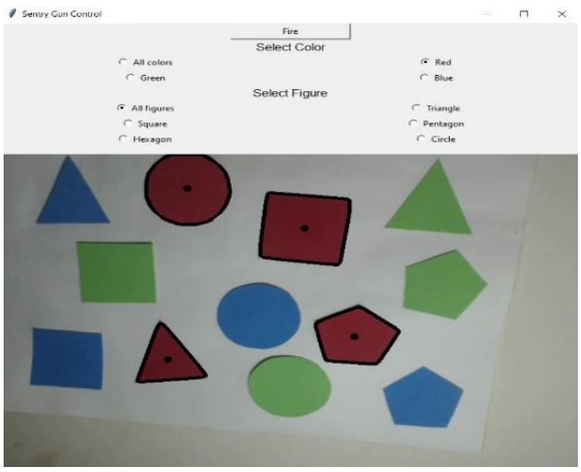

Figure 2

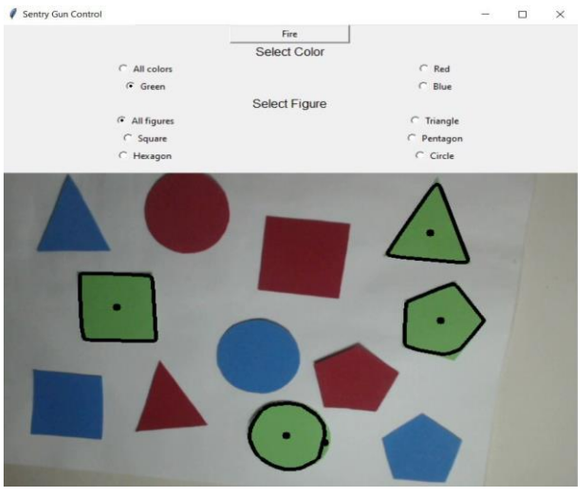

Figure 3

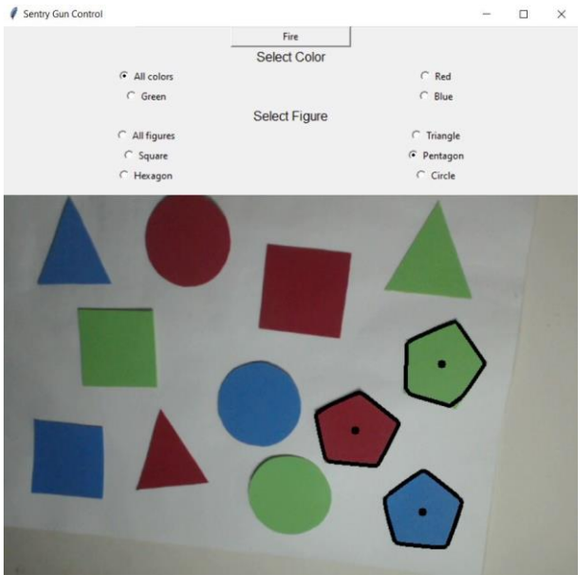

Figure 4

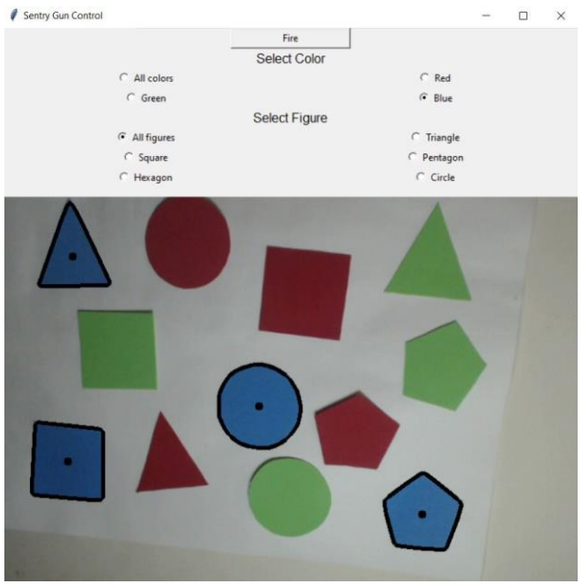

Figure 5

Appendix: Python and OpenCV

```
from tkinter import *
from PIL import Image
from PIL import ImageTk
import cv2
import imutils
import numpy as np

root = Tk()
root.title('Sentry Gun Control')
cap=None

lowRed1 = np.array([0, 100, 20],
np.uint8)
highRed1 = np.array([8, 255, 255],
np.uint8)
lowRed2 = np.array([175, 100, 20],
np.uint8)
highRed2 = np.array([180, 255, 255],
np.uint8)
lowGreen = np.array([36, 100, 20],
np.uint8)
highGreen = np.array([70, 255, 255],
np.uint8)
lowBlue =
np.array([100,100,20],np.uint8)
highBlue =
np.array([125,255,255],np.uint8)

def allSelected():
    global cap
    if cap is not None:
        ret, frame = cap.read()
        if ret == True:
            frame =
imutils.resize(frame, width=720)
        frameHSV=cv2.cvtColor(frame,cv2.
COLOR_BGR2HSV)
        if selColor.get()==0:
```

```
            maskRed1 =
cv2.inRange(frameHSV,lowRed1,highRed1)
            maskRed2 =
cv2.inRange(frameHSV,lowRed2,highRed2)
            maskRed =
cv2.add(maskRed1,maskRed2)
            maskBlue
=cv2.inRange(frameHSV,lowBlue,highBlue)
            maskBlueRed=cv2.add(maskRed,
maskBlue)
            maskGreen=cv2.inRange(frameH
SV,lowGreen,highGreen)
            mask=cv2.add(maskBlueRed,mas
kGreen)
        mask=cv2.medianBlur(mask,7)
        finalFrame=cv2.cvtColor(frameHSV
,cv2.COLOR_HSV2RGB)
        if figure.get()==0:
            drawAll(mask,finalFrame)
        if figure.get()==3:
            drawTriangles(mask,finalFram
e)
        if figure.get()==4:
            drawSquares(mask,finalFrame)
        if figure.get()==5:
            drawPentagons(mask,finalFram
e)
        if figure.get()==7:
            drawCircles(mask,finalFrame)
        im=Image.fromarray(finalFrame)
        img=
ImageTk.PhotoImage(image=im)

        lblVideoProcesado.configure(imag
e=img)
        lblVideoProcesado.image=img
        lblVideoProcesado.after(10,allSe
lected)

def redSelected():
    global cap
    if cap is not None:
        ret, frame = cap.read()
        if ret == True:
            frame =
imutils.resize(frame, width=720)
        frameHSV=cv2.cvtColor(frame,cv2.
COLOR_BGR2HSV)
        if selColor.get()==1:
            maskRed1 =
cv2.inRange(frameHSV,lowRed1,highRed1)
            maskRed2 =
cv2.inRange(frameHSV,lowRed2,highRed2)
            mask =
cv2.add(maskRed1,maskRed2)
        mask=cv2.medianBlur(mask,7)
        finalFrame=cv2.cvtColor(frameHSV
,cv2.COLOR_HSV2RGB)
        if figure.get()==0:
            drawAll(mask,finalFrame)
        if figure.get()==3:
            drawTriangles(mask,finalFram
e)
        if figure.get()==4:
            drawSquares(mask,finalFrame)
        if figure.get()==5:
            drawPentagons(mask,finalFram
e)
        if figure.get()==7:
            drawCircles(mask,finalFrame)
        im=Image.fromarray(finalFrame)
        img=
ImageTk.PhotoImage(image=im)

        lblVideoProcesado.configure(imag
e=img)
        lblVideoProcesado.image=img
        lblVideoProcesado.after(10,redSe
lected)

def blueSelected():
    global cap
    if cap is not None:
        ret, frame = cap.read()
        if ret == True:
            frame =
imutils.resize(frame, width=720)
        frameHSV=cv2.cvtColor(frame,cv2.
COLOR_BGR2HSV)
        if selColor.get()==3:
            mask =
cv2.inRange(frameHSV,lowBlue,highBlue)
        mask=cv2.medianBlur(mask,7)
        finalFrame=cv2.cvtColor(frameHSV
,cv2.COLOR_HSV2RGB)
        if figure.get()==0:
            drawAll(mask,finalFrame)
        if figure.get()==3:
            drawTriangles(mask,finalFram
e)
        if figure.get()==4:
            drawSquares(mask,finalFrame)
        if figure.get()==5:
            drawPentagons(mask,finalFram
e)
        if figure.get()==7:
            drawCircles(mask,finalFrame)
        im=Image.fromarray(finalFrame)
        img=
ImageTk.PhotoImage(image=im)

        lblVideoProcesado.configure(imag
e=img)
        lblVideoProcesado.image=img
        lblVideoProcesado.after(10,blueS
elected)

def greenSelected():
    global cap
    if cap is not None:
        ret, frame = cap.read()
        if ret == True:
            frame =
imutils.resize(frame, width=720)
        frameHSV=cv2.cvtColor(frame,cv2.
COLOR_BGR2HSV)
```

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```
        if selColor.get()==2:
            mask=cv2.inRange(frameHSV,lo
wGreen,highGreen)
        mask=cv2.medianBlur(mask,7)
        finalFrame=cv2.cvtColor(frameHSV
,cv2.COLOR_HSV2RGB)
        if figure.get()==0:
            drawAll(mask,finalFrame)
        if figure.get()==3:
            drawTriangles(mask,finalFram
e)
        if figure.get()==4:
            drawSquares(mask,finalFrame)
        if figure.get()==5:
            drawPentagons(mask,finalFram
e)
        if figure.get()==7:
            drawCircles(mask,finalFrame)

        im=Image.fromarray(finalFrame)
        img=
ImageTk.PhotoImage(image=im)

        lblVideoProcesado.configure(imag
e=img)
        lblVideoProcesado.image=img
        lblVideoProcesado.after(10,green
Selected)

def drawAll(mask,finalFrame):
    cont,_=cv2.findContours(mask,cv2.RET
R_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
    for c in cont:
        epsilon =
0.10*cv2.arcLength(c,True)
        approx =
cv2.approxPolyDP(c,epsilon,True)
        x,y,w,h =
cv2.boundingRect(approx)
        area = cv2.contourArea(c)
        if figure.get()==0:
            area > 3000
            target=cv2.moments(c)
            if (target["m00"]==00):
target["m00"]=1
            x=int(target["m10"]/target["
m00"])
            y=int(target["m01"]/target["
m00"])
            cv2.circle(finalFrame,(x,y),
5,(0,0,0),-1)
            newContour=cv2.convexHull(c)
            cv2.drawContours(finalFrame,
[newContour],0,(0,0,0),3)

def drawTriangles(mask,finalFrame):
    cont,_=cv2.findContours(mask,cv2.RET
R_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
    for c in cont:
        epsilon =
0.10*cv2.arcLength(c,True)
        approx =
cv2.approxPolyDP(c,epsilon,True)
        x,y,w,h =
cv2.boundingRect(approx)
        area = cv2.contourArea(c)
        if len(approx)==3:
            target=cv2.moments(c)
            if (target["m00"]==00):
target["m00"]=1
            x=int(target["m10"]/target["
m00"])
            y=int(target["m01"]/target["
m00"])
            cv2.circle(finalFrame,(x,y),
5,(0,0,0),-1)
            newContour=cv2.convexHull(c)
            cv2.drawContours(finalFrame,
[newContour],0,(0,0,0),3)

def drawSquares(mask,finalFrame):
    cont,_=cv2.findContours(mask,cv2.RET
R_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
    for c in cont:
        epsilon =
0.030*cv2.arcLength(c,True)
        approx =
cv2.approxPolyDP(c,epsilon,True)
        x,y,w,h =
cv2.boundingRect(approx)
        area = cv2.contourArea(c)
        if len(approx)==4:
            target=cv2.moments(c)
            if (target["m00"]==00):
target["m00"]=1
            x=int(target["m10"]/target["
m00"])
            cv2.circle(finalFrame,(x,y),
5,(0,0,0),-1)
            newContour=cv2.convexHull(c)
            cv2.drawContours(finalFrame,
[newContour],0,(0,0,0),3)

def drawPentagons(mask,finalFrame):
    cont,_=cv2.findContours(mask,cv2.RET
R_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
    for c in cont:
        epsilon =
0.035*cv2.arcLength(c,True)
        approx =
cv2.approxPolyDP(c,epsilon,True)
        x,y,w,h =
cv2.boundingRect(approx)
        area = cv2.contourArea(c)
        if len(approx)==5:
            target=cv2.moments(c)
            if (target["m00"]==00):
target["m00"]=1
            x=int(target["m10"]/target["
m00"])
            y=int(target["m01"]/target["
m00"])
            cv2.circle(finalFrame,(x,y),
5,(0,0,0),-1)
            newContour=cv2.convexHull(c)
```

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```
            cv2.drawContours(finalFrame,
[newContour],0,(0,0,0),3)
    cont,_=cv2.findContours(mask,cv2.RET
R_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
    for c in cont:
        epsilon =
0.055*cv2.arcLength(c,True)
        approx =
cv2.approxPolyDP(c,epsilon,True)
        x,y,w,h =
cv2.boundingRect(approx)
        area = cv2.contourArea(c)
        if len(approx)==6:
            target=cv2.moments(c)
            if (target["m00"]==00):
target["m00"]=1
            x=int(target["m10"]/target["
m00"])
            y=int(target["m01"]/target["
m00"])
            cv2.circle(finalFrame,(x,y),
5,(0,0,0),-1)
            newContour=cv2.convexHull(c)
            cv2.drawContours(finalFrame,
[newContour],0,(0,0,0),3)

def drawCircles(mask,finalFrame):
    cont,_=cv2.findContours(mask,cv2.RET
R_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
    for c in cont:
        epsilon =
0.030*cv2.arcLength(c,True)
        approx =
cv2.approxPolyDP(c,epsilon,True)
        x,y,w,h =
cv2.boundingRect(approx)
        area = cv2.contourArea(c)
        if len(approx)>7:
            target=cv2.moments(c)
            if (target["m00"]==00):
target["m00"]=1
            x=int(target["m10"]/target["
m00"])
            y=int(target["m01"]/target["
m00"])
            cv2.circle(finalFrame,(x,y),
5,(0,0,0),-1)
            newContour=cv2.convexHull(c)
            cv2.drawContours(finalFrame,
[newContour],0,(0,0,0),3)

def readVideo():
    global cap
    if cap is not None:
        ret, frame = cap.read()
        if ret == True:
            frame =
imutils.resize(frame, width=720)
            frameHSV =
cv2.cvtColor(frame,cv2.COLOR_BGR2HSV)
            frame=cv2.cvtColor(frameHSV,
cv2.COLOR_HSV2RGB)
            im = Image.fromarray(frame)
            img=
ImageTk.PhotoImage(image=im)
            lblVideo.configure(image=img
)
            lblVideo.image=img
            lblVideo.after(10,readVideo)

            root.update()

def showVideo():
    global cap
    cap =
cv2.VideoCapture(0,cv2.CAP_DSHOW)
    if selColor.get()==0:
        allSelected()
    if selColor.get()==1:
        redSelected()
    if selColor.get()==2:
        greenSelected()
    if selColor.get()==3:
        blueSelected()

selColor = IntVar()
lblColor = Label(root,text='Select
Color', font='bold')
lblColor.grid(column=0,row=1,columnspan=
2)
rbNoneColor = Radiobutton(root,text='All
colors',value=0,variable=selColor,comman
d=allSelected)
rbRed=Radiobutton(root,text='Red',value=
1,variable=selColor,command=redSelected)
rbGreen=Radiobutton(root,text='Green',va
lue=2,variable=selColor,command=greenSel
ected)
rbBlue=Radiobutton(root,text='Blue',valu
e=3,variable=selColor,command=blueSelect
ed)

rbNoneColor.grid(column=0,row=2)
rbRed.grid(column=1,row=2)
rbGreen.grid(column=0,row=3)
rbBlue.grid(column=1,row=3)

figure = IntVar()
lblColor = Label(root,text='Select
Figure', font='bold')
lblColor.grid(column=0,row=4,columnspan=
2)
rbNoneFigure =
Radiobutton(root,text='All
figures',value=0,variable=figure)
rbTriangle=Radiobutton(root,text='Triang
le', value=3,variable=figure)
rbSquare=Radiobutton(root,text='Square',
value=4,variable=figure)
rbPentagon=Radiobutton(root,text='Pentag
on',value=5,variable=figure)
rbCircle=Radiobutton(root,text='Circle',
value=7,variable=figure)

rbNoneFigure.grid(column=0,row=5)
rbTriangle.grid(column=1,row=5)
```

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```
rbSquare.grid(column=0,row=6)
rbPentagon.grid(column=1,row=6)
rbCircle.grid(column=0,row=7)

btnFire=Button(root,text='Fire',width=20
, command=showVideo)
btnFire.grid(column=0,row=0,columnspan=2
)

lblVideo=Label(root)
lblVideo.grid(column=0,row=8,columnspan=
2,pady=10)
lblVideoProcesado=Label(root)
lblVideoProcesado.grid(column=0,row=8,co
lumnspan=2,pady=10)

root.mainloop()
```

Conclusions

This description of tools provides an overview of the key tools and libraries used in a project. Python, serves as the primary programming language for the project. OpenCV, an open-source computer vision and machine learning library, is utilized for various image processing tasks and has a large and active user community. VSCode, a free source code editor, offers a range of features and flexibility for software development, including support for Python programming and Git integration. GitLab, a web-based DevOps tool, provides a comprehensive solution for version control, issue tracking, and continuous integration/deployment pipelines. NumPy, a powerful Python library, facilitates efficient array manipulation and mathematical operations, particularly in the domain of data analysis.

Imutils, an extension of OpenCV, simplifies common image processing tasks with convenient functions. The Python Imaging Library (PIL) offers high-level commands for easy image manipulation. Tkinter, the standard Python interface to the Tcl/Tk GUI toolkit, enables the development of user-friendly graphical interfaces.

The methodology employed a sprint-based approach with four sprints. The initial sprints focused on setting up the development environment, installing dependencies, and developing a command-line interface with webcam integration. Subsequent sprints involved implementing color detection and selecting geometric figures and colors.

The combination of these tools, libraries, and methodologies provided a comprehensive framework for developing an image processing software application using Python.

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Analysis of mobile applications for adults with autism spectrum disorder

Análisis de aplicaciones móviles para personas adultas con trastorno del espectro autista

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Abstract

The article aims to present an analysis of mobile applications that currently serve adults with Autism Spectrum Disorder (TEA) in any of the types or levels that are identified, since the literature varies with respect to the terminology they use. Therefore, an investigation of the applications they can access was carried out to identify what kind of support they provide to users, since these can be focused on the adaptation of the environment in which the person works, to organize their days and identify how they should behave at certain events, or in their case they work as support for family members. Derived from the analysis, a minimum percentage of the applications that serve adults with TEA is identified, giving guidelines to the fact that mobile applications can be designed and developed that can serve them with the aim of improving the way they interact with their family, school, social and work environment.

Analysis, Mobile app, Autism, Spectrum, Technology

Resumen

El articulo tiene como objetivo presentar un análisis de las aplicaciones móviles que actualmente atienden a personas adultas con Trastorno del Espectro Autista (TEA) en cualquiera de los tipos o niveles que se identifiquen, dado que la literatura varía con respecto a la terminología que emplean. Por lo que, se realizó una investigación de las aplicaciones a las que pueden acceder para identificar el tipo de apoyo brindan a los usuarios, dado que estas pueden estar enfocadas a la adaptación del entorno en el que se desempeña la persona, para organizar sus días e identificar como deberían de comportarse en ciertos eventos, o en su caso funcionan como apoyo a los familiares. Derivado del análisis se identifica un porcentaje mínimo de las aplicaciones que atienden a personas adultas con TEA, dando pauta a que se pueden diseñar y desarrollar aplicaciones móviles que puedan atenderlos, con el objetivo de mejorar la forma de interactuar con su entorno familiar, escolar, social y laboral.

Análisis, App móvil, Autismo, Espectro, Tecnología

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Introduction

Currently, the use of mobile and web applications provides a technological tool for people with ASD and the people they interact with on a daily basis. They allow for more fluid interaction between both parties, thus increasing the development of social skills. However, it is important to identify which ones already exist and what benefits they provide or what is the focus of attention for ASD.

Some applications offer the possibility of being able to develop other skills in deficits such as attention, anticipation, executive functions, working memory, sequences of actions, organisation of events, etc. (Gallardo-Montes, 2021).

The analysis is presented with the aim of conducting research to identify the mobile applications that are currently available for adults with some type of ASD in order to have or provide a better quality of life. In addition to knowing what is the area of attention for people who want to use them.

Most of the applications are focused on attending to children, given that this is the ideal age at which it can be detected that an individual has ASD, however sometimes it is not detected in that age range, given that the symptoms are minimal, but as they are not attended to in time, then it is usually difficult to detect them at later ages but as they are not treated the situation is more difficult to recognise that they have symptoms and that they need support to improve the quality of life within their environment.

Analysis of mobile applications

ASD, better known as autism, is a neurodevelopmental disorder that causes challenges in the development of social, communication and behavioural skills in people who have it. It usually manifests in childhood and lasts throughout life.

All people with ASD are different from each other, hence the name spectrum, as the characteristics are highly variable in each case. So each of these variables can affect how they can learn and develop skills for or against their well-being.

Autism is a group of diverse conditions related to brain development. Characteristics can be detected in early childhood, but often autism is not diagnosed until much later. Approximately one in 100 children has autism. The abilities and needs of people with autism vary and may evolve over time. While some people with autism can live independently, there are others with severe disabilities who need constant care and support throughout their lives (WHO, 2023).

Scotto Carolina, 2019, mentions that: "people with autism present a neurobiological condition of a very heterogeneous variety that affects early development, that is, in the first years of life, these individuals present a great variety of symptoms, such as difficulties in communication, in intentional behaviour, in the recognition and expression of emotions from facial expressions, in speech and body language (Enticott et al., 2014). If there are such impairments (observable in the early stages of development), impairments in social performance in general and in reading more sophisticated emotions might be expected.

Families may have access to various applications that are offered for people with ASD for mobile devices. Therefore, they tend to access these applications with confidence in certain applications, but as most of these are specially oriented to a certain type of ASD, they do not always meet the expected purpose for them, but as mentioned in previous paragraphs, it is a spectrum, so not all possible cases to be addressed are identified one hundred percent.

The user interfaces of applications must be analysed and designed correctly, in order to have an optimal usability or interaction with them, to perceive and understand correctly the use of each element (e.g. buttons, text, navigation), to ensure the correct functioning of the applications.

Xiaojie Lian (2023) in his article where he presents a user interface evaluation of an application, refers to two authors who mention the following: Eraslan et al. (2019) conducted an eye-tracking study with high-functioning autistic adults and neurotypical participants to examine whether people with autism have different processing strategies with web pages.

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The findings revealed that people with autism tend to look at more elements on a webpage than neurotypical participants and proposed improvements to existing web accessibility guidelines; and Rezae et al. (2020) evaluated the user interface of a mobile navigation software for adults with autism using eye movement analysis, showed that autistic users interact with user interfaces differently than non-autistic users, and made recommendations for improving user interface design.

For the above mentioned reasons it is important to perform a proper analysis of the design of user interfaces for apps.

Researching in Google Play Store, using the keywords autism adults, only 7 applications focused on adults were found, it is worth mentioning that if only autism is placed there are more than 200 applications, but mostly to serve children, the search was conducted on 14/08/2023, but following the objective of this analysis was deepened by identifying which applications meet the needs of adults with ASD. It was observed that some applications are not related to or directly address autism. Given the minimal number of applications and the diversity of approaches to autism, it is important to be careful with the choice of one or another in order to obtain good results.

The purpose of table 1 is to present the applications focused on adults with ASD, including brief information about the applications, such as: name of the application, age range, platform or operating system in which they work and a description of what they do.

No.	Application/ Age range/ Operating System	Description
1	Proloquo2Go/ No hay límite de edad / iOS	Symbol-based augmentative and alternative communication app. Natural-sounding texts can be added in all languages or use local accents (Google Play, 2023).
2	Autism Test (Adult)/ Adulta/ Android	Diagnosis of high-functioning autism, as detection can be delayed until adulthood (Google Play, 2023).
3	NeuroSchemas For Autism/ Adulta/ Android y iOS	Allows you to choose the scheme that best suits a social situation.
4	Learn Autism/ No hay límite de edad/ Android	Choose an event to learn implicit social rules and overcome challenges (Google Play, 2023).
5	MagnusCards - Autism App/ Adulta/ Android y iOS	Learn Autism provides FREE access to evidence-based information on a wide range of topics, from pre-diagnosis to adulthood (Google Play, 2023).
6	Hiki: Autism Friendship Dating/ Adulta/ Android y iOS	MagnusCards provides collectible instructions designed to assist autistic and neuro-diverse individuals with activities of daily living, including money management, self-care, cooking and travel. Each collectible card deck is created in partnership with businesses, venues and non-profit organisations to assist and encourage community engagement and life skills development (Google Play, 2023).
7	Leo - AAC & Autism Speech Aide/ No hay límite de edad/ Android	Free dating and friendship app created BY and FOR autistic people. Our mission is to make it easier to meet and form genuine, unmasked relationships. With features tailored to neurodivergent communication styles, you can spend less time explaining your quirks and more time relating to them (Google Play, 2023).

Table 1 Applications for adults with ASD
Source: Own elaboration

Of the applications presented in table 1, only one allows the diagnosis of high-functioning autism, in this type they do not show delays with respect to the general population, they are usually agile, like physical activities, which can derive other areas of attention, they also present motor difficulties in adolescence, as a consequence of an abnormal body image and low self-esteem. As well, they show little attachment to their mother from the beginning of their lives, which extends to other significant others during the time of upbringing.

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They also lack interest in their peers, lack understanding of other people's emotions and show no interest in developing social interactions. They are also unable to recognise their problems in this regard (The Swan, 2023).

The main functionality of the applications presented in Table 1 is mostly focused on improving the quality of communication, ease of interaction with society and interaction with their environment for people with ASD.

It is difficult for a person in his adult age to accept that he presents symptoms or behaviours of autism, if he still does not know that he suffers from this type of disorder. Therefore, it is necessary that society knows and identifies this type of behaviours, given that it is complicated to coexist with people who have these behaviours, without knowing the reason of their behaviours, and nowadays, when not understanding their ways of acting, there is a tendency to exclude these people.

It is important to identify the different types or degrees of autism that can be identified in adults. Therefore, some of them are mentioned below:

- Asperger's Syndrome: This type of autism is the most difficult and, sometimes, late to be diagnosed, given that the affected persons do not have any type of intellectual disability or physical trait that identifies them. The deficit is in the field of social skills and behaviour, being important enough to seriously compromise their development and social and labour integration. They also present problems of social interaction, lack of empathy, poor psychomotor coordination, not understanding irony or the double meaning of language, and obsession with certain subjects, these are some of the most common characteristics (VIU, 2022).
- Pervasive developmental disorder not otherwise specified: This is a form of diagnostic labelling used in cases where the clinical symptoms are too heterogeneous to be included in any of the other types. But the symptoms they present are: social reciprocity disorders, severe communication problems and the existence of peculiar, restricted and stereotyped habitual interests and activities (VIU, 2022).

It is difficult to detect symptomatology by various professionals, however, sometimes there is an indication that an adult has an ASD and that it was not diagnosed and treated in time, which is why they sometimes express that -they have been a strange subject all their lives, an introverted, quiet, naive person who does not understand jokes or does not realise that someone is teasing them-, to put it colloquially.

Sánchez, 2023, mentions: Massaguer (Berta Massaguer Bardají, Clinical Coordinator of Neurodevelopment at Ita) provides other possible warning signs: "Having an unusual tone of voice; making facial expressions, movements and gestures that do not coincide with what is being said; having an intense and prolonged interest in certain subjects; presenting a lack of responsibility and having difficulties in carrying out household chores or maintaining a stable job; having difficulty following conversations; modulating intermittently or avoiding eye contact; difficulties in understanding another person's point of view...".

However, in recent times, there has been a greater identification of symptomatology presented by adults with ASD, according to María Verde Cagiao, psychologist of the Research area of Autism Spain, since "it is more and more frequent that adults go to clinics and services of psychological and psychiatric assessment looking for a diagnosis". In some cases, these are parents who, "as a result of the diagnosis of their children, discover that they themselves are also within the spectrum" (Sánchez, 2023).

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Results

The objective of the analysis was achieved due to the fact that the existing applications to date were identified and what each of them performs. In a probabilistic way, considering the data presented in previous sections, it can be estimated that considering as a sample 200 applications with a focus on people with ASD regardless of age as 100%, thus obtaining that only 3.5% of the applications cater to the adult population, and that they only address certain needs and leave out others. Therefore, applications can be developed to address those areas that are not included in the existing ones.

Conclusions

Based on the analysis carried out, the need for the development of applications that cater to adults with some level of ASD is detected, due to the fact that many people are not attended to at an early age and are living in environments in which they are not included in an appropriate manner and are sometimes unintentionally discriminated against, given that society is not yet prepared to interact in an appropriate manner, even in the environments in which they have to perform.

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Development of a medical application as an integrative activity

Desarrollo de una aplicación médica como actividad integradora

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Abstract

The importance of collegiate work in educational instutets of all levels has been increasing in recent years. In the case of the Universidad Autónoma de Tlaxcala with the incorporation of integrative activities combining different learning units, accordingly the development of specific software becomes more complete, helping the Computer Engineering student to combine their knowledge in a planned manner. This paper presents a Medical Application project, specifically focused on the development of a medical appointment generator called Vida Sana, which was built as an integrative activity using the reference model CMMi Dev Level 2 model, under the waterfall methodology. The idea is that software development is done by the students in an organized manner, coordinating individual learning of seven learning units to achieve a quality application for Android mobile devices.

Integrative Activity, Medical Application, CMMi

Resumen

La importancia del trabajo colegiado en las instituciones educativas de todos los niveles ha ido en aumento en los últimos años. En el caso de la Universidad Autónoma de Tlaxcala con la incorporación de actividades integradoras por semestre, conjuntando diferentes unidades de aprendizaje, en consecuencia el desarrollo de un software específico se vuelve más completo, ayudando al estudiante de Ingeniería en Computación a combinar sus conocimientos de una manera planificada. En el presente artículo se presenta un proyecto de Aplicación Médica, específicamente se enfoca en el desarrollo de un generador de citas médicas llamado Vida Sana, el cual fue construido como actividad integradora utilizando el modelo de referencia CMMi Dev Nivel 2, bajo la metodología de cascada. La idea es que el desarrollo de software se haga de manera organizada por los estudiantes, coordinando el aprendizaje individual de siete unidades de aprendizaje para lograr una aplicación de calidad para dispositivos móviles Android.

Actividad Integradora, Aplicación Médica, CMMi

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Introduction

This project presents an integrative activity focused on the development of a medical application, carried out over three semesters, based on the CMMi Dev level 2 quality model, specifically the development of a medical appointment manager.

The Vida Sana application allows scheduling medical appointments through a calendar, making it easy to use, also working appointments for clinical analysis, blood samples and urine analysis, providing a better control between patients and specialists, as well as solving the problems that are generated when making an appointment in person, such as possible infections, long lines and waiting time.

Working method

In the educational programme of Computer Engineering of the Autonomous University of Tlaxcala, the integrating activity has been organised by formative fields, specifically this project is developed in the formative field of Applied Engineering. The first thing to be done is an analysis of which projects will be developed to cover the different learning units. The Software Engineering learning units have been chosen as a basis to cover the waterfall development cycle and the use of CMMi Dep level 2, and because they allow the implementation of a set of practices for software development.

The Medical Applications integrative activity was worked on over the course of three semesters, the learning units per semester are listed below:

First stage - Fifth semester

1. Requirements Engineering and Estimation
2. Database Queries and Optimisation
3. Human Computer Interaction

Second Stage - Sixth Semester

1. Software Design and Modelling
2. Computing for Mobile Devices
3. Development of Virtual Environments

Third Stage - Seventh Semester

1. Software Testing and Deployment
2. CMMi and Integrating Activity

The integrating activity is considered a didactic, pedagogical, epistemic and methodological curricular implementation, which allows the higher education student to articulate theory with practice and to mediate the mobilisation of their knowledge in the integral development of their professional training, and to be able to achieve the desired graduate profile [1].

The CMMI model (Capability Maturity Model integrated) is a best practice model, published by the Software Engineering Institute in 1994 with the aim of sharing best practices in software development with the industry [2].

Medical application

During this integrative activity 13 teams participated, belonging to two groups of Computer Engineering, each one developing a different medical management application, which started in the fifth semester and are finishing their project in the seventh semester.

Some of the medical applications that have been worked on are:

- Vital signs assessment.
- Diabetes self-diagnosis.
- Generation of medical appointments.
- Calculating calorie intake.
- Generation of invoices for a hospital.

The medical appointment generator has been selected for this article. A medical appointment generator allows you to manage the appointments of a practice or hospital in an orderly manner.

Related work

Here are some related works, either using a web system or mobile devices.

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Centro Jel Riobamba Medical Appointment Manager

Since the JEL Physical Therapy Centre did not have a medical appointment system, a mobile application for appointment management was developed, which has reduced the backlog of medical appointments. During the development stage of the mobile application, the agile methodology Mobile-D and the hybrid framework Ionic were used. The mobile application was evaluated by expert users in usability, with the aim of knowing the degree of usability that the application contains by means of a survey, the expert users consider that it is easy to use, to learn and recommended the use of the mobile application [3].

Medical appointments at the Municipal Hospital Los Olivos

The Web System for Medical Appointment Booking Processes at the Municipal Hospital Los Olivos was developed to avoid waiting time for patients to request a medical appointment. The Web System is developed based on the RUP (Rational Process Unified) methodology and with MySQL database that will allow to carry out the activities of the user in charge in the determined process. The present research project is of applied type, with a Preexperimental design [4].

Control of medical appointments for the clinic of the Ecuadorian Air Force No. 11 Wing in Quito

The Design and Implementation of Software for Medical Records Management and Medical Appointment Control for the Ecuadorian Air Force Clinic of the 11th Wing in Quito was developed by students combining research and development oriented to medicine and computer science, the software allows the management of medical records and control of medical appointments to raise the level of service at the clinic [5].

Vida Sana application

The Vida Sana application allows patients to schedule medical appointments through a calendar in a simple, efficient and controlled manner.

The first stage of the development of the Vida Sana application was worked on in the fifth semester, where three learning units were involved.

In the Requirements Engineering and Estimation learning unit, the documentation of the Requirements and Planning Phases was elaborated according to CMMi Dep Level 2 specifications, as these phases are indispensable for a correct definition of requirements and to ensure the fulfilment of the project plan. Figure 1 shows the functionality of the Vida Sana system as an example.

Nº	Nombre del Caso de Uso	Prioridad	Complejidad
01	CU01_Registrar usuarios	Esencial	Simple
02	CU02_Registrar especialistas	Esencial	Simple
03	CU03_Iniciar sesión	Esencial	Simple
04	CU04_Calendarizar citas	Esencial	Medio
05	CU05_Visualizar especialistas	Esencial	Simple
06	CU06_Revisar perfil	Util	Simple
07	CU07_Reagendar citas	Esencial	Medio
08	CU08_Revisar historial	Util	Medio
09	CU09_Subir resultados médicos	Esencial	Complejo
10	CU10_Revisar resultados médicos	Esencial	Complejo

Figure 1 Functionality of Vida Sana

Figure 2 shows the Vida Sana use case diagram.

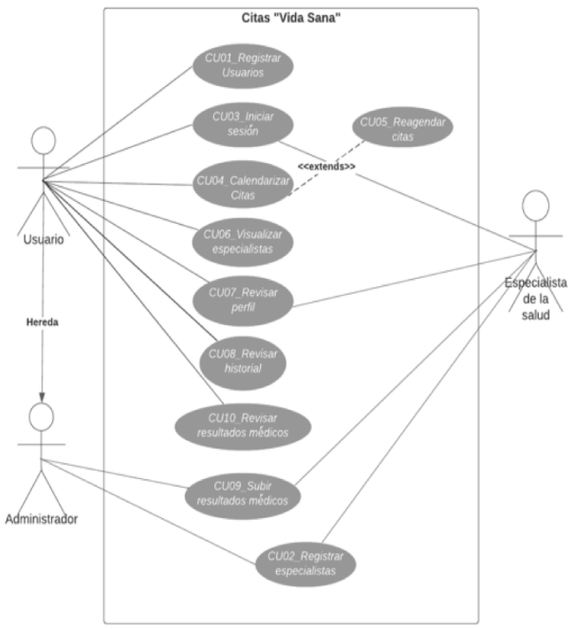

Figure 2 Vida Sana Vida use cases

In the learning unit of Queries and Database Optimisation we worked with the Entity-Relationship Model and SQL queries, Figure 3 shows the Healthy Life Entity-Relationship Model.

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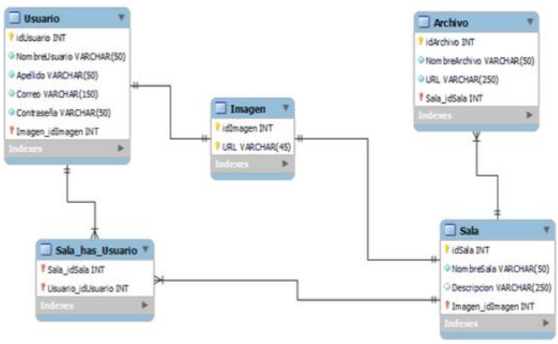

Figure 3 Entity-Relationship Model

The Human-Computer Interaction learning unit dealt with the design of Interfaces using figma, as well as considering the following usability principles.

Ease of use and understanding of the interfaces.

Shortcuts in the application.

Minimise user workload with the use of a calendar for scheduling medical appointments.

User-friendly functionalities.

Allows undoing of actions performed in case of user error. Two interfaces that were worked on in the Human Computer Interaction learning unit are shown below, see Figure 4 and Figure 5. The interfaces were developed in Figma, a prototyping tool and vector graphics editor, which is hosted on the web.

Figure 4 Vida Sana Registration Interface

Figure 5 Calendar to schedule appointments in Vida Sana

For the second stage of development, the following three learning units were worked on.

In the learning unit Software Design and Modelling, the logical design with UML diagrams and the construction of the application were carried out. Figure 6 shows a sequence diagram, which indicates that the scheduling of appointments is an essential functionality of the application, in which the patient must select the available date from a calendar. Subsequently, he/she can choose the desired time, the type of appointment required and the corresponding medical specialist. Once this process is completed, the patient user can save the appointment and access it in the "scheduled appointments" section. This function allows an efficient and organised management of medical appointments, providing the patient with the convenience of visualising and having complete control over their scheduled appointments.

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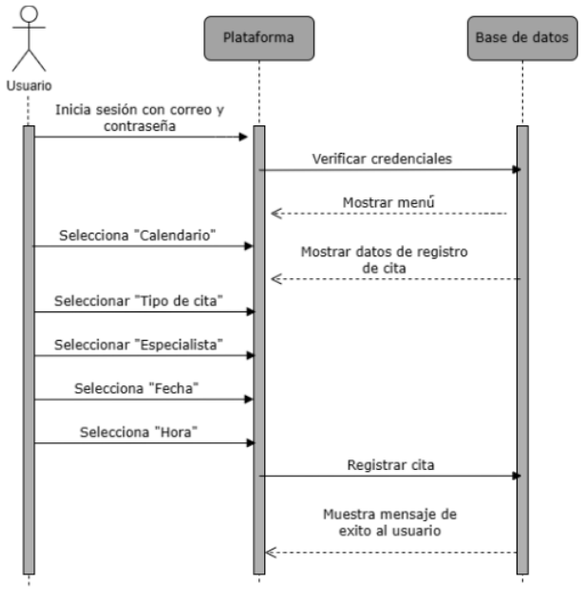

Figure 6 Sequence diagram of Vida Sana Register

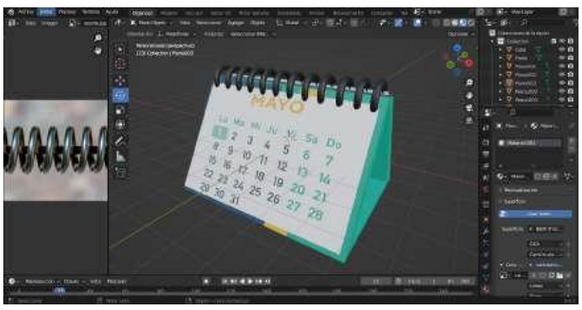

Figure 7 3D Calendar made in Blender

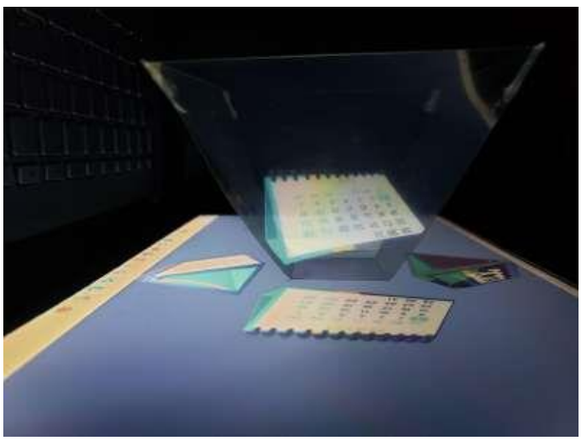

Figure 8 Pyramidal holography of the calendar

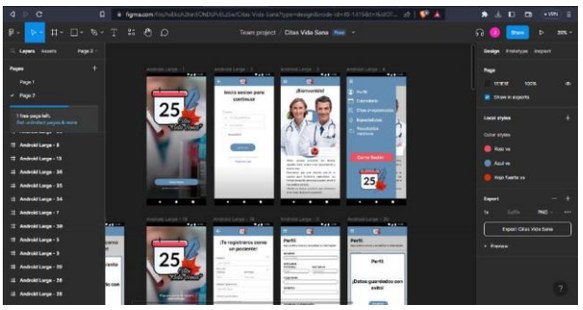

Figure 9 Implementation of the Healthy Living Application

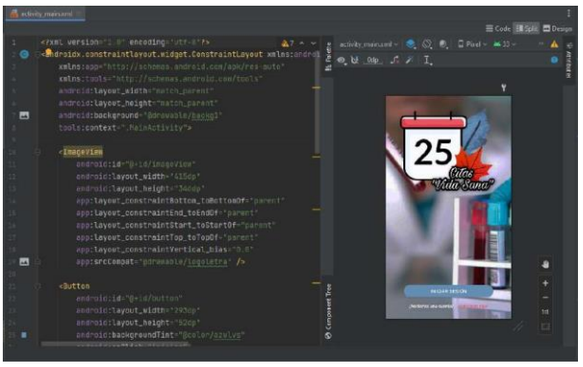

Figure 10 Vida Sana main screen

In the learning unit Design of Virtual Environments we worked with 3D modelling of objects related to the application and pyramidal holography, for the dissemination of the integrative activity, where we used the methodology of virtual worlds found in [6]. Figure 7 shows a calendar modelled in 3D using Blender, Figure 8 shows the pyramidal holography of the calendar.

In the learning unit of Computing for Mobile Devices, the application was developed using Android Studio, as it allows to make mobile applications in a friendly environment, the application was programmed in Java language. Figure 9 shows the implementation of the Vida Sana application. Figure 10 shows part of the Vida Sana code.

The third phase is currently being worked on in the Software Testing and Implementation learning unit, where different tests are carried out for each application developed, including Vida Sana, as well as the implementation of the developed software.

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Conclusion

The educational programme of Computer Engineering is a degree that works with multidisciplinary teams, since nowadays the use of software and applications is highly demanded, so it is feasible to look for projects that solve a problem in a real context where software can be used. Each software developed allows the student to apply their knowledge from the different learning units, giving a more complete context when teachers and students come together.

Including CMMi Dev Level 2 allows the software developed to be approached at all stages with a quality focus, ensuring that it can be used for what it was created for.

Finally, venturing into the area of medicine has been enriching for both students and teachers, achieving positive feedback from participants.

Acknowledgement

It is acknowledged that the selected project Generador de Citas Vida Sana is developed by the Computer Engineering students of the Universidad Autónoma de Tlaxcala: Juan Carlos Dotor González, Wendy Amanda Rodas Lira, Alexandra Sosa Zaragoza and Juan Pablo Vázquez Contreras.

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Design and development of chatbot for the BITOO platform

Diseño y desarrollo de chatbot para la plataforma BITOO

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Abstract

The objective is to present the design and development of a chatbot for implementation on the Bitoo platform of the company Softura Solutions S. de R. L., as a tool that allows customers to be served 24/7 to resolve doubts about the use of the platform, the implementation of chat will generate a reduction in time in user support and the minimization of absorption of time invested by Bitoo's Marketing team. For the development of this, tests were carried out on the functionality of the platform, to detect any possible doubts that users had, and thus consider them in the chatbot. Dialogflow, a free licensing tool, was used for the development of the chatbot, as well as the configuration and the appropriate language for dialogues that provide answers to the most common questions that users may have. This project contemplates the use of artificial intelligence areas implemented in Dialogflow, such as: natural language processing and machine learning.

Machine learning, Chatbot, Artificial intelligence

Resumen

El objetivo es presentar el diseño y desarrollo de un chatbot para su implementación en la plataforma Bitoo de la empresa Softura Solutions S. de R. L., como una herramienta que permita atender a los clientes las 24 horas, los 7 días de la semana, para la resolución de dudas del uso de la plataforma, la implementación del chat generará una reducción de tiempo en el soporte a usuarios y la minimización de absorción de tiempo invertido por parte del equipo de Marketing de Bitoo. Para el desarrollo de este, se realizaron pruebas de la funcionalidad de la plataforma, para detectar las posibles dudas que tuvieran los usuarios, y así contemplarlas en el chatbot. Se empleo Dialogflow herramienta de licenciamiento libre para el desarrollo del chatbot, así como la configuración y el lenguaje apropiado para los diálogos que permitan dar respuesta a las preguntas más comunes que puedan tener los usuarios. En este proyecto se contempla el uso de áreas de inteligencia artificial implementadas en Dialogflow, como lo son: procesamiento de lenguaje natural y aprendizaje automático.

Aprendizaje automático, Chatbot, Inteligencia artificial

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† Researcher contributing as first author.

Introduction

This article aims to present the design and development of a chatbot for the Bitoo platform, which aims to serve users and customers in an automatic way. In order to increase the number of affiliated businesses and customers who purchase a product or service offered through it.

The implementation of chatbots is currently being developed in most companies that offer services or products is necessary. Therefore, the company Softura Solutions needs to innovate with this technological tool in its platform called Bitoo.

For the development of the project it is necessary to keep in mind that Artificial Intelligence (AI) provides areas of knowledge that are involved and are necessary to apply, such as: machine learning and natural language processing. Specifically for this project, the functionality of the tools available on the market for its development was analysed.

Theoretical framework

Artificial Intelligence, currently applied in many areas, is the core of the fourth technological revolution. In the business sector, AI is used for customer relationship management as applied in automated response systems, i.e. chatbot.

A chatbot is a computer programme that simulates and processes human conversations (either written or spoken), allowing humans to interact with digital devices as if they were communicating with a physical person. Chatbots can be as simple as rudimentary programmes that respond to simple queries with a one-line response or as sophisticated as digital assistants that can learn and evolve to provide increasing levels of personalisation as they gather and process information (Oracle, 2023).

Chatbots are an essential tool in the marketing relationship as many companies apply this function to their website; therefore, the influence of chatbots on the company's integrated marketing communication (IMC) activities has been studied, resulting in impulse buying behaviour and repurchase intention behaviour (Bui Thanh Khoa, 2021).

The current era is lived with information overload. Although the basic principles of marketing will remain the same, to a much greater extent they become individualised and contextualised, allowing companies/brands to convert their current market orientations. The multiplicity of media and related channels imposes the need to process messages as well as stimuli in a constant and uninterrupted way. With this approach, updating related to digital technologies becomes an inherent element of marketing while allowing various market players to come together in an easier and more comprehensive way than ever before (Kaczorowska, 2019).

Chatbots allow companies to interact with an unlimited number of customers on a personal basis and can be scaled up or down according to demand and business needs. By using chatbots, a company can provide proactive, personalised, human-like service to millions of people at the same time (Oracle, 2023).

Chatbots, induced by AI, automatic rules, Natural Language Processing (NLP) and Machine Learning (ML) process data to provide answers to requests of all kinds. There are two types of chatbots which are:

1. Task-oriented (declarative) chatbots, which are single-purpose programs that focus on performing a function. They employ PLN rules and very little ML, generating automated but conversational responses to user queries. Interactions with these conversational bots are very specific and highly structured, making them applicable to support and customer service functions. The chabot guide for the Bitoo platform is based on this type of chatbot.

2. Data-driven and predictive (conversational) chatbots are often referred to as virtual assistants or digital assistants and are much more advanced, interactive and personalised than task-oriented chatbots.

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For the creation of chatbots there are several free softwares available on the internet, some of these allow you to configure different services such as: allow you to easily create chatbots to help your team qualify leads, schedule meetings, provide answers to frequently asked technical questions, and much more.

a) Salesforce LATAM, 2019, defines a lead as a potential customer who has shown interest in a product or service offered by the brand through interaction with content and other materials.

b) According to the needs and considering the recommendation of one of the company's technology advisors, Dialogflow software was used, which is a natural language understanding platform that facilitates the design of a conversational user interface and its integration to an application for mobile devices, web applications, devices, bots, interactive voice response systems and more. With Dialogflow, you can provide new and engaging ways for users to interact. Dialogflow provides two different virtual agent services, each of which has its own agent type, user interface, API, client libraries and documentation (Google Cloud, 2022).

c) For this case study Dialogflow ES was used which provides a standard agent type suitable for small and simple agents. The standard agent type it handles is suitable for small to medium and simple to moderately complex agents. The sections described below must be configured:

- The Intentions which are the goals or actions you want to achieve with the chatbot. This section links each of the intentions with a series of training sentences.
- The Entities extract important information from the user's interactions, either because the user is providing this information in the first iteration or through questions that are asked.
- Contexts allow the conversation to be natural and fluid. It is necessary to work with the contexts to transfer information between the different intentions and to make the conversation as natural as possible.

Methodology

The following sections describe the steps that were carried out for the chatbot.

a) The design of the chatbot was elaborated with the Figma tool. Figure 1 shows the main interface of bitoo with a view on a smartphone, and the chatbot button is displayed on the right side in the central part of the interface. Clicking on it presents the chatbot interface (see figure 2). Figure 3 illustrates the interaction with a user.

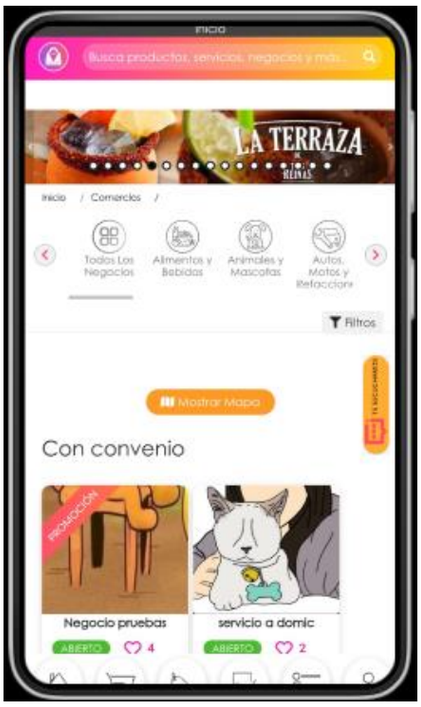

Figure 1 Chatbot button

b) The Google account is configured, as you must have one to access this tool. Then access the Dialogflow site, select or create the project to be configured (see figure 4).

c) Generate and/or configure the intentions (see figure 5).

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Figure 2 Chatbot interface

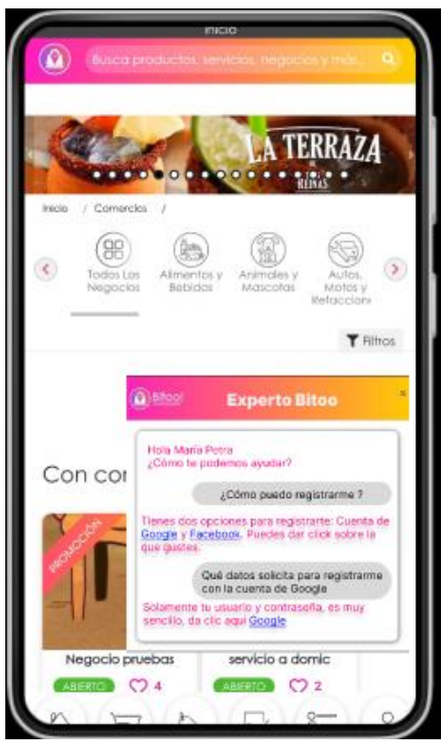

Figure 3 Interaction with the chatbot

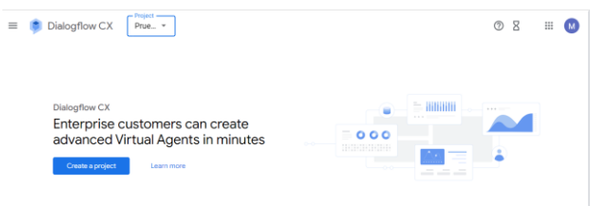

Figure 4 Dialogflow interface

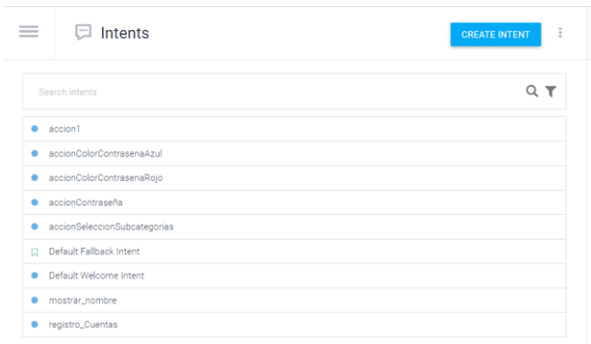

Figure 5 Intents Interface

d) Entities are generated and configured (see figure 6).

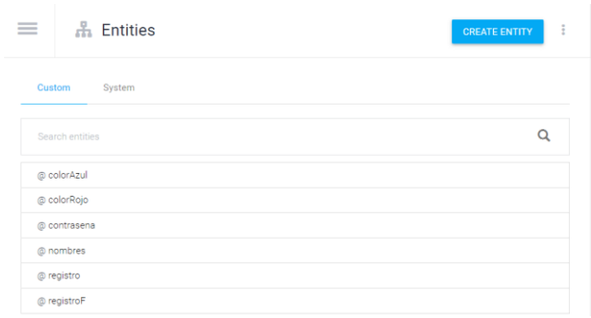

Figure 6 Entity Interface

e) Contexts are created and/or configured (see figure 7 and 8).

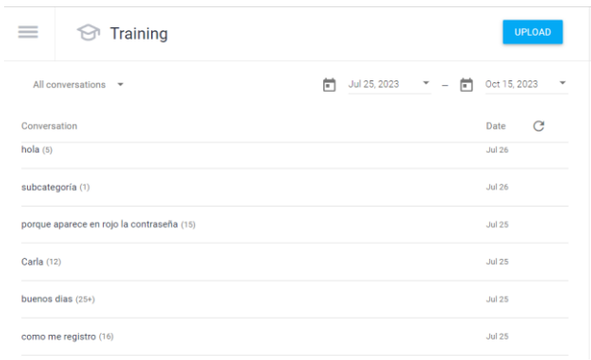

Figure 7 Contexts Interface

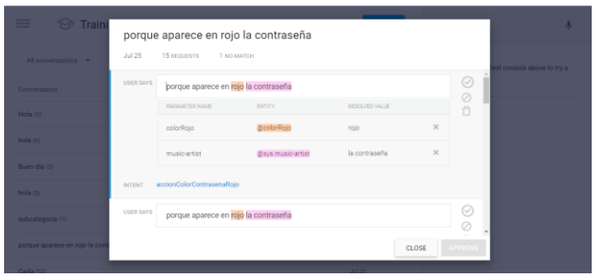

Figure 8 Context Configuration.

Results

Firstly, the Bitoo platform was explored to identify the information process in the different sections, with the aim of contemplating in the chatbot functionalities in which the user could have doubts or not have the knowledge of what action to perform. Because even if the company trains the user in the use of the platform or provides a user manual, when the user is confronted with the use of the platform alone, without the support of an expert in its use, doubts always arise or the dialogues are not the right ones to reduce the questions that the user may have. On the other hand, as users it is difficult to make use of a user manual, so the doubts were identified and considered for inclusion in the chatbot.

We tested the logical sequence of the answers given by the chatbot, and that they cover the coherent functionality. Figure 9 illustrates a sequence of how the customer interacts with the chatbot.

Acknowledgement

This article is the result of the work that was carried out in the company Softura Solutions S. de R. L., under the direction of Guillermo Álvarez Carrión and the support of his collaborators, to whom we are grateful, for making possible the realization of this work.

Conclusions

Digital marketing is a trend with too much boom in daily life, so it is important to take care of the aspects of customer service, so the integration of a chatbot on a platform like Bitoo serves to support users of this.

Since it supports them with possible doubts that may arise when interacting with this, and provide real-time attention, it results in ensuring the use of the platform correctly and therefore increases the percentage of partners, customers and sales for the company Softura Solutions S. de R. L.

The Dialogflow tool that was used is free license and has more services that could be contemplated to have a complete kit of services that can offer to the clients of the company in an appropriate way.

Annexes

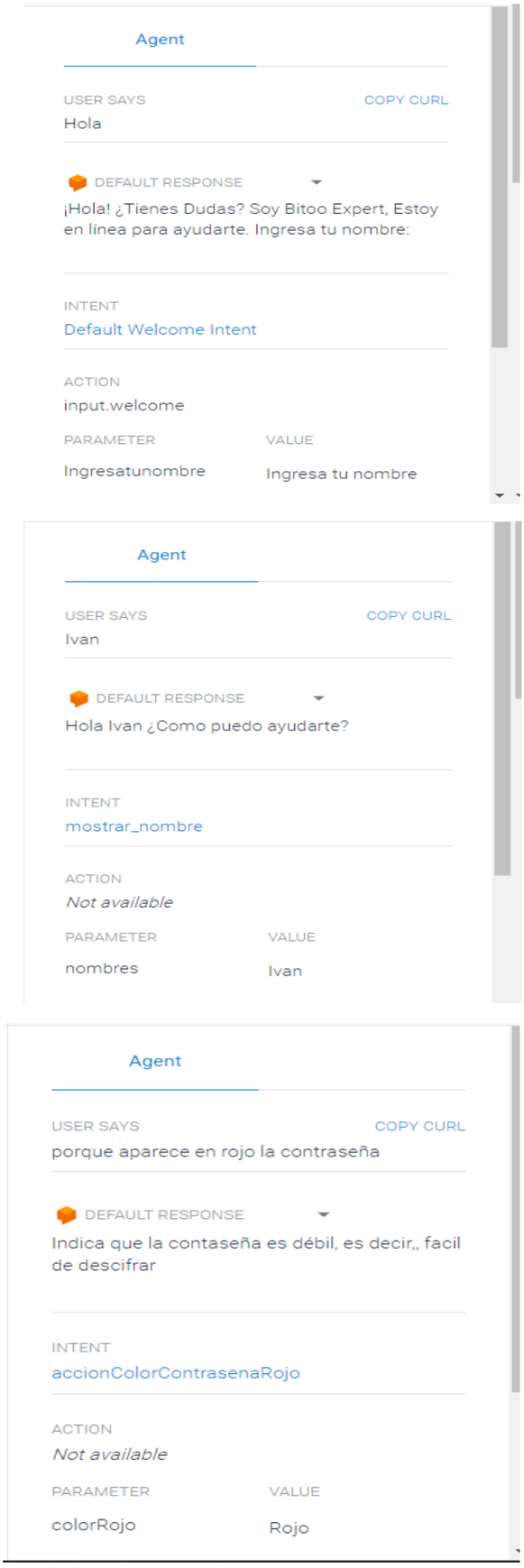

Figure 9 Interaction with a user

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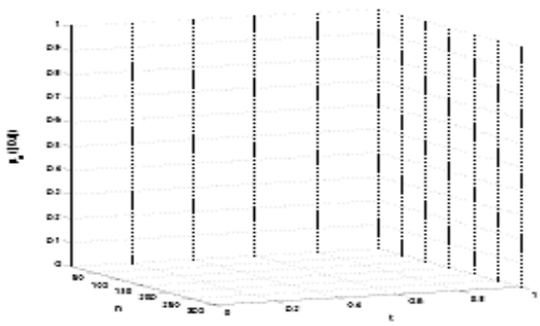

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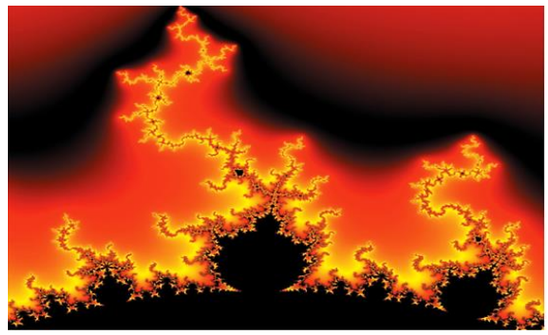

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