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SMART CLASSROOM ATTENDANCE SYSTEM USING FACE RECOGNITION

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Abstract: The COVID-19 pandemic outbreak has resulted in an unprecedented crisis across the globe. The pandemic created an enormous demand for innovative technologies to solve crisis-specific problems in different sectors of society. In the case of the education sector and allied learning technologies, significant issues have emerged while substituting face-to-face learning with online virtual learning. Several countries have closed educational institutions temporarily to alleviate the COVID-19 spread. The closure of educational institutions compelled the teachers across the globe to use online meeting platforms extensively. The virtual classrooms created by online meeting platforms are adopted as the only alternative for face – to-face interaction in physical classrooms. In this regard, student's attendance management in virtual classes is a major challenge encountered by the teachers. Student attendance is a measure of their engagement in a course, which has a direct relationship with their active learning. However, during virtual learning, it is exceptionally challenging to keep track of the attendance of students. Calling student's names in virtual classrooms to take attendance is both trivial and time-consuming. Thus, in the backdrop of the COVID-19 pandemic and the extensive usage of virtual meeting platforms, there is a crisis-specific immediate necessity to develop a proper tracking system to monitor student's attendance and engagement during virtual learning. In this project, we are addressing the pandemic-induced crucial necessity by introducing a novel approach. In order to realize a highly efficient and robust attendance management system for virtual learning, we introduce the Random Interval Query and Face Recognition Attendance Management System(hereafter, AI Present).

Keywords: virtual classroom, attendance, random interval query.

I. INTRODUCTION

A virtual classroom is an online teaching and learning environment where teachers and students can present course materials, engage and interact with other members of the virtual class, and work in groups together. The key distinction of a virtual classroom is that it takes place in a live, synchronous setting. Online coursework can involve the viewing of pre-recorded, asynchronous material, but virtual classroom settings involve live interaction between instructors and participants. Virtual classrooms and distance learning, as alternate technology-driven learning methods, have been growing at a reasonable pace. Virtual classrooms have been specifically in use by all sectors, including primary and higher education as well as corporate learning.

The increasing popularity of social and micro learning strategies, fostered by general social media platforms like YouTube and Twitter, and major educational technology disruptions liked X, have added to the increasing acceptance of virtual modes of learning. It is expected that the predominant use of virtual classrooms would increase by a whopping 16.2% compounded annual growth rate by 2023. Nevertheless, virtual classrooms have not yet been considered as a serious alternative or substitute for the contemporary face-to-face (F2F) learning.

Things have started to look different, however, in the wake of the current, novel corona virus COVID-19 pandemic, since the entire world is under lockdown. It is the time of the year when academic and teaching activities are in full swing in most parts of the world. The current pandemic situation has paved the way for a ground test of virtual classrooms as a prominent tool of learning in the current times.

II. LITERATURE REVIEW

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external supports. This support can be obtained from senior

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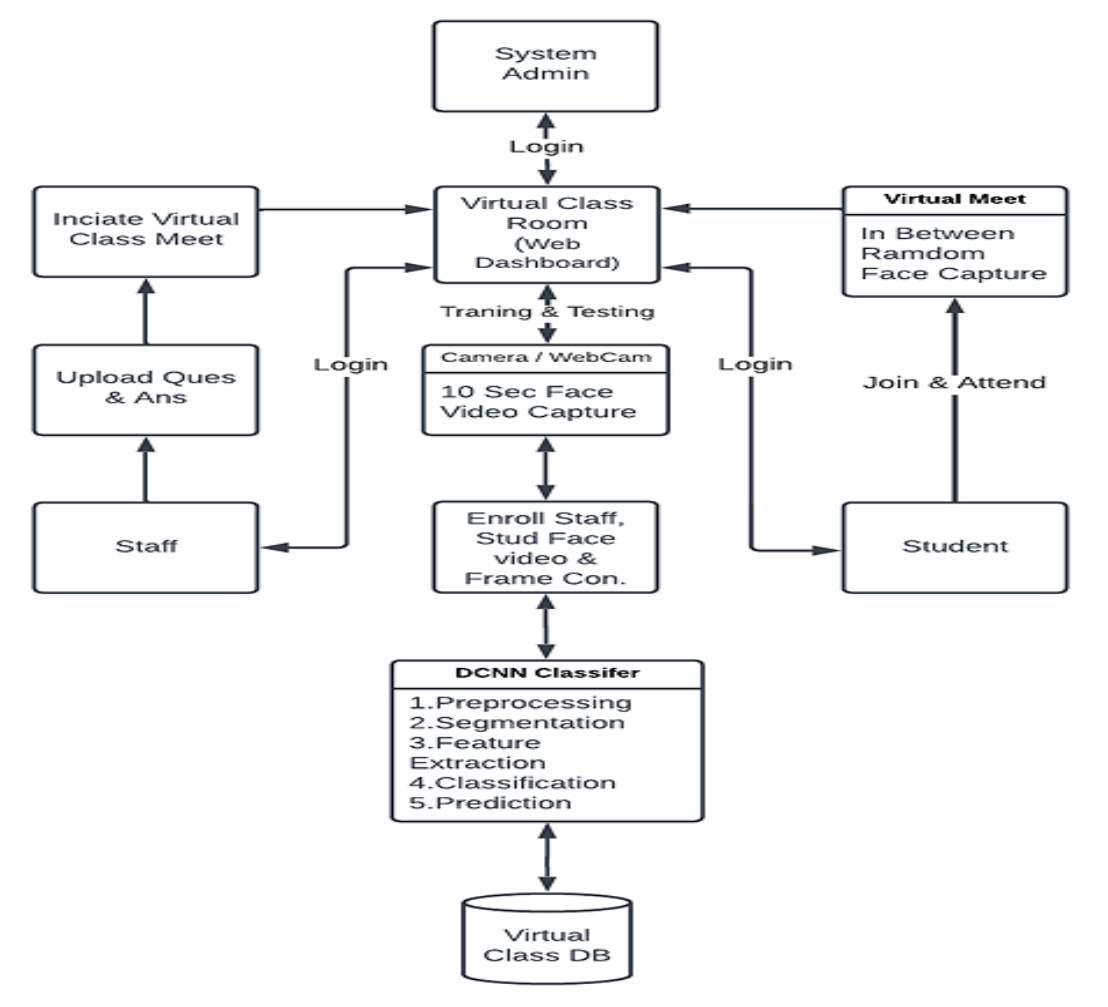
programmers, from book or from websites. Before building the system the above consideration are taken into account for developing the proposed system.

The major part of the project development sector considers and fully survey all the required needs for developing the projects. For every projects literature survey is the most important sector in software development process. Before developing the tool and the associated designing it is necessary to determine and survey the time factor, resource requirement, manpower, economy and company strength. Once these things are satisfied and fully surveyed then the next step is to determine about the software specifications in the respective system such as what type of operating project would require , and what are all the necessary software are needed to proceed with the next step such as developing the tools , and the associated operations.

III. MATERIALS AND METHODS

A use case is a description of how a person who actually uses that process or system will accomplish a goal. It's typically associated with software systems, but can be used in reference to any process.

Figure 1: use case



IV. METHODOLOGY

This project has many features which such as the facility of user login and teacher's login. Also, on the top of all this, there is an admin who will be managing the entire application's authorization and authentication, not any intruder can login and modify the data, as a login for admin is also available

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A. Architecture diagram

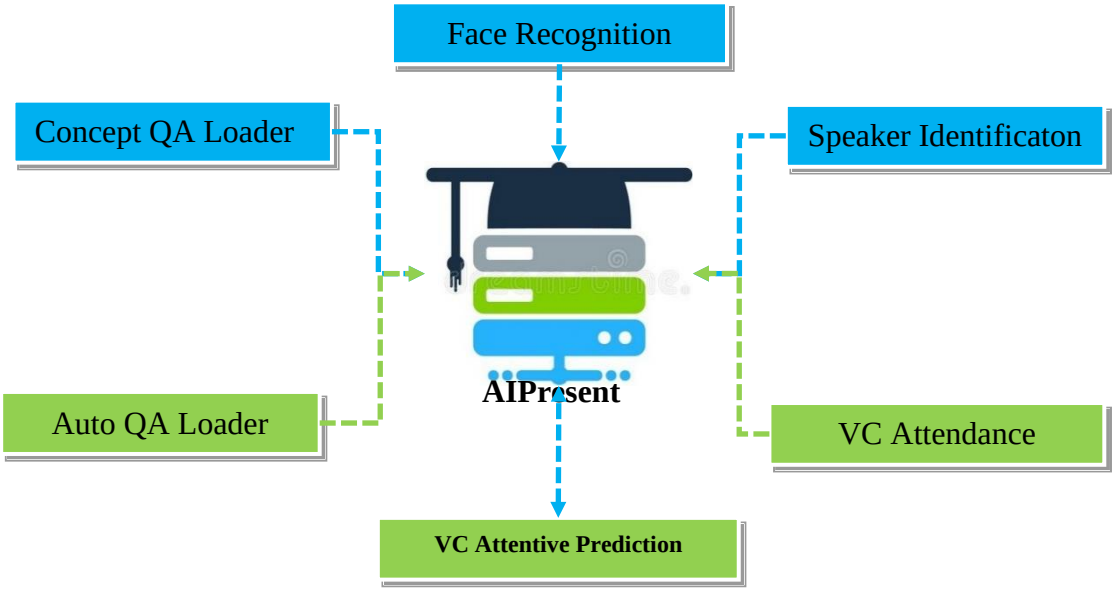

Figure A :Architecture diagram

B.**CLASS DIAGRAM**

A class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modeling Language (UML).

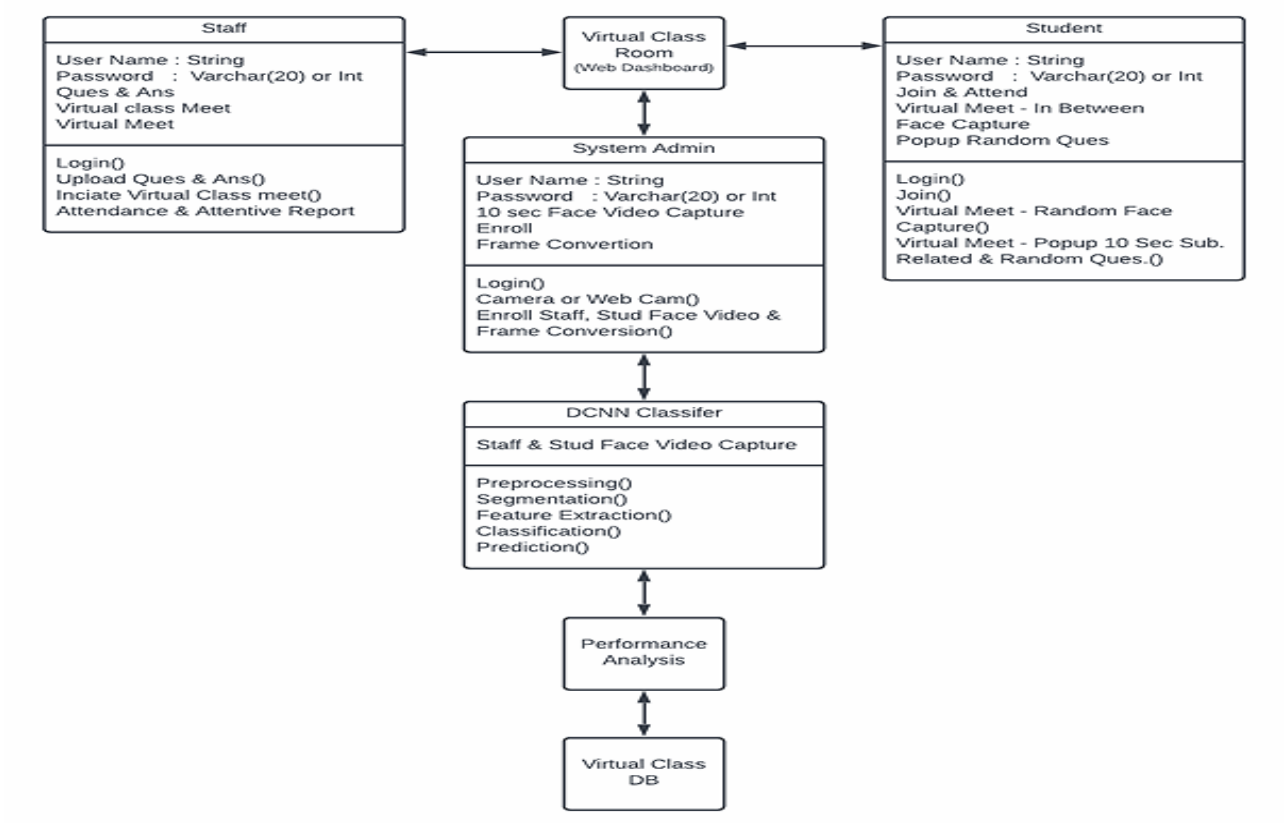

Figure B: **Class diagram**

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Implementation

I].Input Design:

Student Databases Server maintained in this system are student information database, face database and attendance database

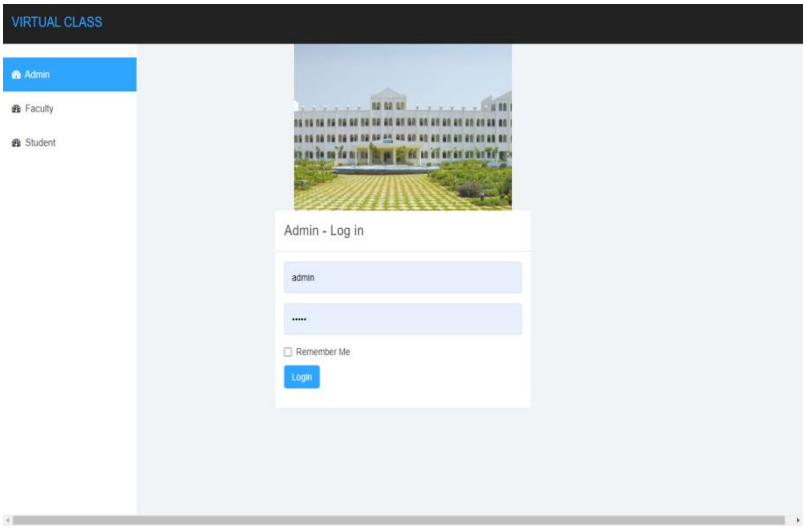

Figure 2: HOME PAGE

This is of generic type software, suitable to all colleges. This software has all the modules to manage students attendance. Separate division is provided to maintain attendance process like Enrollment, verification, attendance system and performance analysis.

```
@app.route('/ins_att',methods=['POST','GET'])
def ins_att():
    uname=""
    if 'username' in session:
        uname = session['username']

    print(uname)
    data=[]
    tday=0
    act=""
    mycursor = mydb.cursor()
    mycursor.execute("SELECT distinct(category) FROM ci_category")
    value1 = mycursor.fetchall()

    mycursor.execute("SELECT distinct(year) FROM ci_student")
    value2 = mycursor.fetchall()

    if request.method=='POST':
        dept=request.form['dept']
        sem=request.form['semester']
        act="1"
        mycursor.execute("SELECT count(*) FROM ci_answer where dept=%s && semester=%s group by rdate",(dept,sem))
        tt = mycursor.fetchall()
        x=0
        for ts in tt:
            x+=1
        tday=x

        mycursor.execute("SELECT * FROM ci_student where dept=%s && semester=%s",(dept,sem))
        dat = mycursor.fetchall()

        for rr in dat:
            dat3=[]
            mycursor.execute("SELECT count(*),sum(attend) FROM ci_answer where dept=%s && semester=%s && regno=%s",(dept,sem,rr[2]))
            dat2 = mycursor.fetchone()
            print(dat2)
            r2=0
            if dat2[1] is None:
                r2=0
```

Figure 3: coding

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II]. Output:

AI Present facilitates precise and automatic tracking of student's attendance in virtual classrooms. It incorporates a customized face recognition module along with specially designed ancillary sub modules. Both the face recognition and the sub modalities are for student's attendance monitoring in virtual classrooms

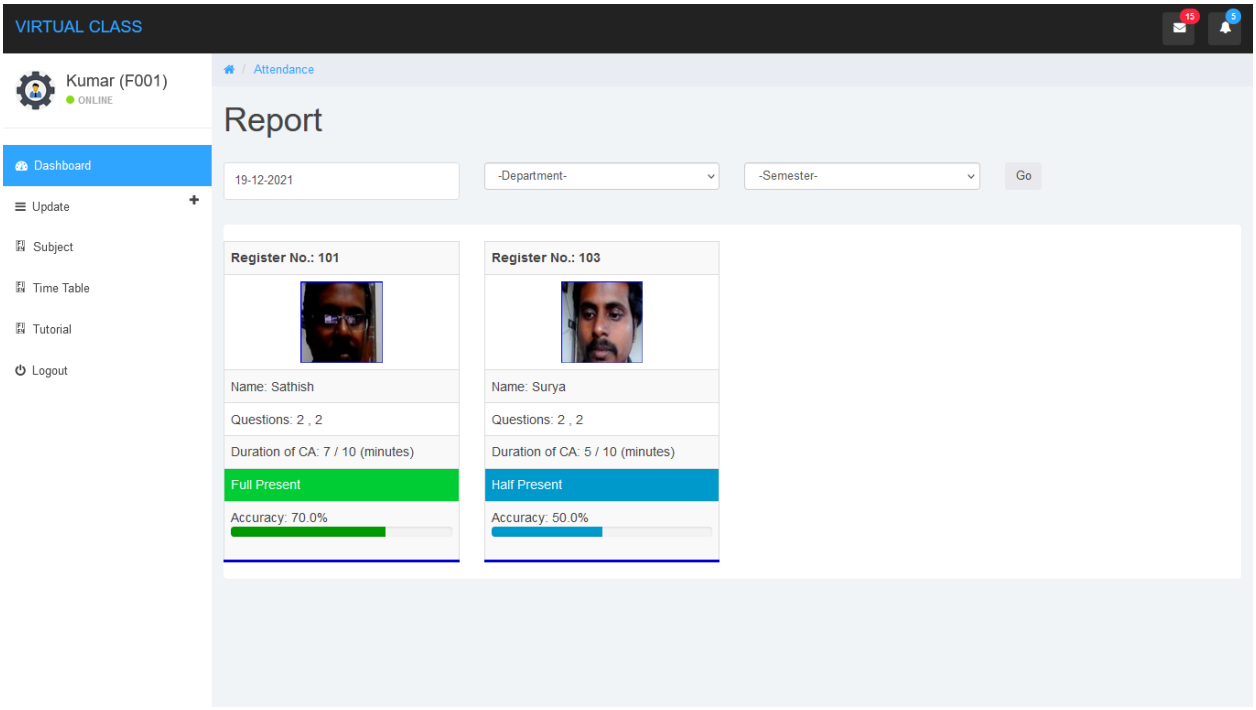

Figure 4: Output

V. RESULTS

A. Pseudo Code/Sequence of Micro Operation/Flowcharts

```
@app.route('/meet',methods=['POST','GET'])
def meet():
    msg=""
    uname=""
    act=""
    if 'username' in session:
        uname = session['username']
    print(uname)
    pid=request.args.get('pid')
    tid=request.args.get('tid')
    per=request.args.get('per')
    ss=per.split('-')
        mycursor = mydb.cursor()
    mycursor.execute("SELECT * FROM ci_student where regno=%s",(uname, ))
    value3 = mycursor.fetchone()
    name=value3[1]
    dept=value3[8]
    sem=value3[9]
    capst=value3[16]
    staff=value3[17]
    value=[]
    data=[]
```

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```
   if capst==1:
      act="1"
   else:
      act=""
ff11=open("start.txt","r")
   start=ff11.read()
   ff11.close()
if start=="2":
      now = datetime.datetime.now()
      rdate=now.strftime("%d-%m-%Y")
      stime=now.strftime("%H:%M")
      print("start")
     mycursor.execute("SELECT count(*) FROM ci_time where regno=%s && rdate=%s",(uname, rdate))
      cnt = mycursor.fetchone()[0]
      if cnt==0:
         mycursor.execute("SELECT max(id)+1 FROM ci_time")
         maxid = mycursor.fetchone()[0]
         if maxid is None:
            maxid=1
         sql = "INSERT INTO ci_time(id,regno,rdate,stime,num_mins,etime,staff) VALUES (%s, %s, %s, %s,
%s,%s,%s)"
         val = (maxid, uname, rdate, stime, '0','0',staff)
         print(val)
         mycursor.execute(sql,val)
         mydb.commit()
               else:
         mycursor.execute("SELECT * FROM ci_time where regno=%s && rdate=%s order by id desc limit
0,1",(uname, rdate))
         value4 = mycursor.fetchone()
         idd=value4[0]
         mins=value4[4]
         num_mins=mins+1
         stm=value4[3].split(':')
         etime=""
                  h1=int(stm[0])
         m1=int(stm[1])
         m2=num_mins
         m3=m1+m2
         if m3>59:
            d1=m3/60
d2=int(d1)*60
            d3=int(d1)+h1
            if d3>23:
               hh=24
               d3=d3-hh
            d4=m3-d2
            etime=str(d3)+":"+str(d4)
                     else:
               etime=str(h1)+":"+str(m3)
            print(etime)
         mycursor.execute("SELECT * FROM ci_user where uname=%s",(staff, ))
         value33 = mycursor.fetchone()
         tot=value33[9]
         mycursor.execute('update ci_time set etime=%s,num_mins=%s,tot_time=%s WHERE
id=%s',(etime,num_mins,tot,idd))
         mydb.commit()/
```

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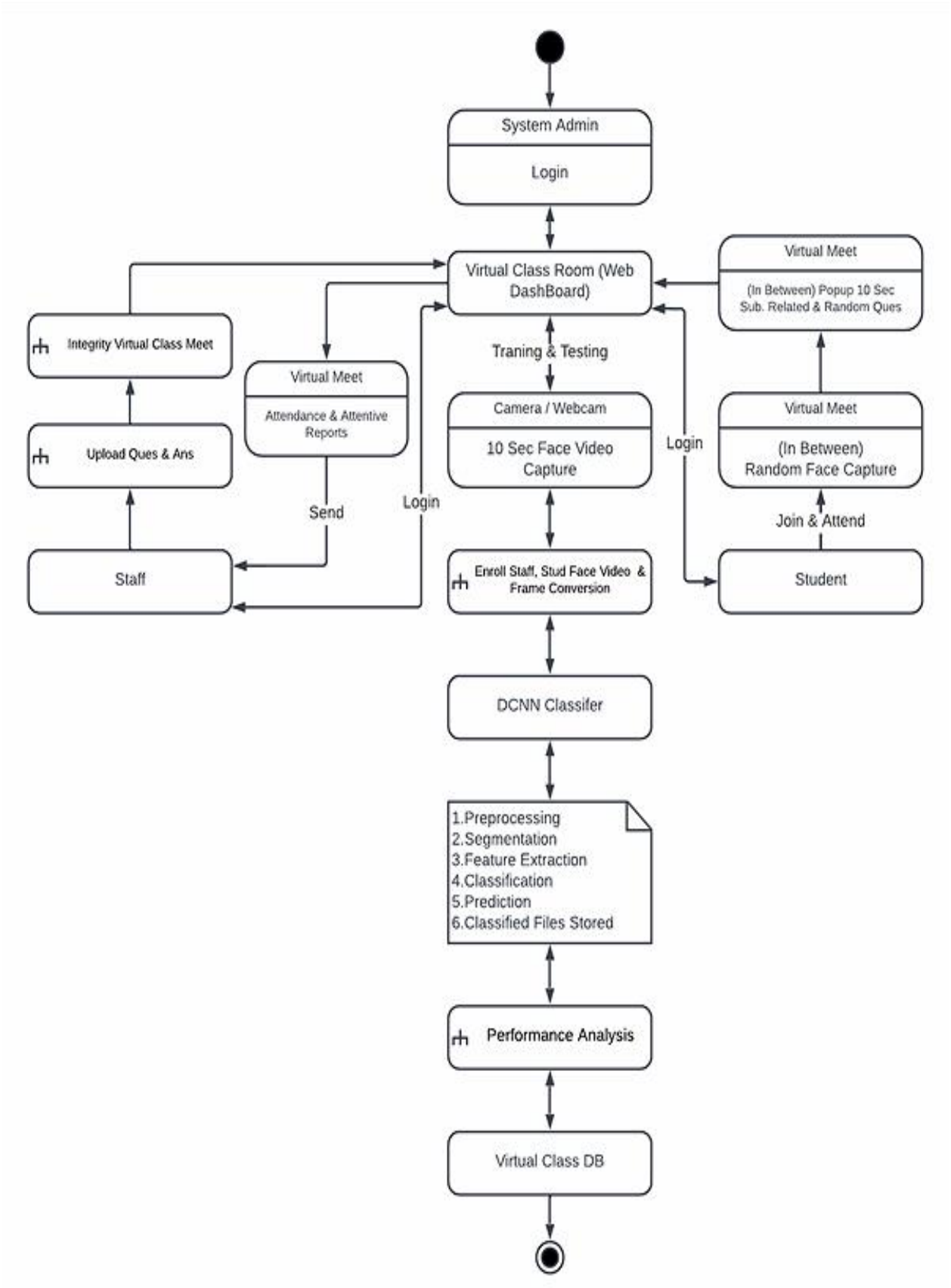

Figure 5: Flow Chart

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B. Development Process for the Procurement System

Random Interval Attendance Management System (AI Present)is an innovation based on Artificial Intelligence – Deep Learning, specially designed to help the teachers/instructors across the globe for effective management of attendance during virtual learning. AI Present facilitates precise and automatic tracking of student's attendance in virtual classrooms. It incorporates a customized face recognition module along with specially designed ancillary sub modules

VI CONCLUSION

Random Interval Attendance Management System (AI Present)is an innovation based on Artificial Intelligence – Deep Learning, specially designed to help the teachers/instructors across the globe for effective management of attendance during virtual learning. AI Present facilitates precise and automatic tracking of student's attendance in virtual classrooms. It incorporates a customized face recognition module along with specially designed ancillary sub modules. Both the face recognition and the sub modalities are for student's attendance monitoring in virtual classrooms. The sub modules check student's responses to CAPTCHAs, Concept QA and UIN queries. The system captures face biometric from the video stream of participants and gathers the timely responses of students to Concept QA and UIN queries, at random intervals of time. An intelligible and adaptive weighting strategy is employed for finalizing the decisions from the three modalities. AI Present could be integrated with any existing virtual meeting platform through an application interface like a web page or specific app.

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