Evaluation task for GSOC-23

Warmup 1 - You first ROOT script in C++

Code:

```cpp
#include <string>
#include <iostream>
#include "TObject.h"

class classreq : public TObject {
public:
    inline classreq(std::string const &name, std::string const &ttl, int value)
        : name_{name}, ttl_{ttl}, value_{value} {}
    inline void Print(Option_t *option = "") const override
    {
        std::cout << name_ << " " << ttl_ << " " << value_ << std::endl;
    }
private:
    std::string name_;
    std::string ttl_;
    int value_;
};

void solution1() {
    classreq myObj("name", "ttl", 1);
    myObj.Print();
}
```

Warmup 2 Excercise:

Warmup 2 - Your first ROOT script in Python

import ROOT

ROOT.gSystem.Load('')

obj = ROOT.MyClass(11)

obj.Print()

Cli: MyClass::Print() called with value = 42

Regenera

FINAL EVALUATION TASK:

```
#ifndef JSON_FACTORY_H
#define JSON_FACTORY_H

#include <string>
#include <memory>
#include <nlohmann/json.hpp>
#include "MyClass.h"
class JSONFactory {
public:
    static std::unique_ptr<TObject> string(std::string const &jsonStr);
};
std::unique_ptr<TObject> JSONFactory::string(std::string const &jsonStr) {
    auto json = nlohmann::json::parse(jsonStr);
    std::string calling = "new " + json["class"].get<std::string>() + "{";
    bool firstArg = true;
    for (auto& arg : json["args"]) {
        if (!firstArg) calling += ", ";
```

```
        calling += "\"" + arg.get<std::string>() + "\"";
        firstArg = false;
    }
    calling += "};";
    return std::unique_ptr<TObject>(reinterpret_cast<TObject*>(gInterpreter-
>ProcessLine(calling.c_str())));
}

#endif
import json
import ROOT
def create_from_json(class_name, args):
    json_str = json.dumps({
        "class": class_name,
        "args": args
    })
    instance = ROOT.JSONFactory.string(json_str)
return instance.get()
obj_1 = ROOT.MyClass("first", "The First Instance", 1)
obj_1.Print()
obj_2 = create_from_json("MyClass", ["first", "instance", 1])
obj_2.Print()
```

Harsh **Kumar**

SECOND YEAR UNDERGRAD STUDENT

(+91) 7015485229 | 12112011@nitkkr.ac.in| harshkumar09104@gmail.com | https://github.com/harsh2929|

Education

National Institute of Technology Kurukshetra (India) *Expected May 2025*
Computer Science and Engineering

Shanti Niketan Public School, Hisar *Feb 2021*
HIGH-SCHOOL
CBSE-AISSCE : 92.3%

O.P Jindal Modern School, Hisar *May 2019*
HIGH-SCHOOL
CBSE-AISSE : 92.3%

Objective&Interests

To pursue graduate studies in computer science and engineering, leading to a career in research in applied physics in computer science. My interests are computer graphics, computer vision and quantum computing.

Projects

GNN-TORCH

Pytorch

- Currently working on a GNN project implemented through pytorch
- Implemented subgraph matching

APHRODITE

OPENGL/EARTH RENDERING

- Used open-gl to render earth with minimal resources
- Implemented day/night and currently working to simulate heatwaves on the rendering.
- Simulated different topographic conditions modelling earth.

CUDA-PROCESSOR

3D PROJECTION/GAME ENGINE

- Processed vcf files using CUDA engine
- Implemented algorithms for gpu parallelization for CPU

POINT CLOUD PROCESSING

3D PROJECTION/GAME ENGINE

- used auction algorithm for point cloud processing
- implemented point cloud comparison

INTERNAL IMAGING

3D PROJECTION/RECONSTRUCTION

- Created a renderer for generating body-images
- Used python libraries to accurately model body structure with the provided dataset.

NFS-DATA PROCESSING

GAME-DATA PROCESSING

- Worked on data processor and analysis of the popular game need for speed
- Implemented graphical data visualization for various aspects of the game

Annul-lator

Android privacy application

- Worked on an android application for shutting down all basic utilities in case of distress events.
- Added data clearing and fake location utility.
- Implemented remote control of the device upon loosing access via simple sms communication.
- Implemented Pegasus spyware detection on mobile phone.

Native-Messenger

React-Native based chat application

- Created an React-native based messenger application.
- Implemented high security standards using end to end encryption.
- Added real-time based chatting utility
- Added no-metadata collection utility
- Implemented two factor authentication

DJANGO PAYMENT SYSTEM

Python based payment system

- Created an online payment system on Django
- Integrated UPI

ACHIEVEMENTS

2021 **Achieved a top 0.7 percentile rank in the Joint Entrance Exam among 0.94 million aspirants** *Hisar, India*

Skills

Programming Languages

- C++ • Python • C • Java • C# • PHP •NodeJs •Dart

Frameworks and Libraries

- Ray • Keras •Tensorflow •Pytorch •CUDA •OpenGl

Relevant Coursework

- Design and analysis of Algorithms
- Data Mining and warehousing using python
- Probability and Statistics
- Web Design
- Linux and Unix programming
- Discrete Mathematics
- Operating system
- Programming and Data Structures

Certifications

***(under going)**

- Hands-on Machine Learning with AWS and NVIDIA*
- Using Machine Learning in Trading and Finance*
- Reinforcement Learning in Finance by NYU*
- Decentralized Finance (DeFi) Infrastructure by DUKE UNIVERSITY
- Fundamentals of Quantitative Modelling by University Of Pennsylvania

Research

Heat Wave Detection*

***(Submitted for final evaluation)** *Kururkshetra, India*

UNDERGRADUATE RESEARCHER *Nov 22'–Jan 23'*

- Completed work on Heat Wave detection program utilising neural networks.
- Created a cheaper alternate to expensive dataset available online using open source “Nasa- Power” dataset
- Efficiently determined possible heat-wave with an accuracy of 94.5%
- Improved PlaSim climate model to render better and more accurate models

- Used and validated the softmax regression for analysing and predicting “rare-events”

Extracurricular Activity

Sponsorship Committee

Kurukshetra,India

MEMBER

Jan 2022 - Present

- Participated in the fundraising for college’s yearly fest by gathering sponsorships from various corporations.
- Fundraised for“Shiksha” club of college, to providing basic education utilities for underprivileged students of nearby schools.

The Justice For Human Right(N.G.O)

India

MEMBER

Dec 2022 - Present

- Organized and conduct workshops and info-sessions on human rights and fundamental rights in the modern world context.
- Submitted a full stack application for the organization for hosting.
- Modelled the correlation of income vs disadvantaged group with other variables and indicators