



COPS Summer of Code 2025

Intelligence Guild

Club Of Programmers, IIT (BHU) Varanasi

Computer Vision WEEK 2

16 – 22 June 2025

Official IG Website: <https://cops-iitbhu.github.io/IG-website/>

All deadlines are strict. No extensions will be granted.

Introduction

COPS Summer of Code (CSOC) is a flagship initiative under the Club Of Programmers, IIT (BHU) Varanasi, with all verticals contributing through focused tracks. This document outlines the prerequisites for the Intelligence Guild vertical.

Modules will be released weekly and from time to time. **Adhere strictly to deadlines.** Submissions will be evaluated on approach, technical correctness, and clarity. The most technically accurate solution may not necessarily be the one chosen; clarity of thought and a well-reasoned approach will be valued more.

Communities

All communication for the programme will be conducted strictly via [Discord](#). Do not reach out through other channels. Resources and updates will be posted on [Github](#), and all notifications will be made via Discord.

Final Report

A concise report may be submitted along with your final assignment. While **not mandatory**, it may strengthen your overall evaluation. Reports must be written in \LaTeX and submitted in PDF format only. We are not interested in surface-level descriptions — focus strictly on your analysis, approach, and reasoning. The report itself constitutes the final assignment. No additional files are to be submitted. Refer to the Assignment section for details. Submit your report [here](#).

Contact Details

In case of any doubts, clarifications, or guidance, you can contact one of us. We request that you stick to Discord as the preferred mode of communication for all the questions that you have as it will also benefit others. However, you can reach out to us through other means in case we fail to respond on Discord.

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Resources

Object Detection

This section provides useful resources for Object Detection algorithms starting from RCNN to YOLO :

- **Explaining AI**: This is a very comprehensive playlist covering all the object detection models like RCNN , YOLO , DETR etc.. and also the metrics used in this field . It also covers some codes regarding them.
- **Yolo V1 from Scratch**: This video by Aladdin pearson covers the code of YOLO V1 from scratch .
- **YOLO V3 from Scratch** : If you are done with the above two then you can try this also.

It's not necessary to write the whole code from scratch and train every object detection model but the essence and important features of every model should be known and understood why it is used , also you must know how to write their code (atleast the pseudo code) .

Image Generation

The most exciting and trending application of Computer vision is Image Generation . In this section you will find resources regarding the foundational models of Image generation. Don't Worry if you don't get the math behind any of this , you will understand overtime as you explore this domain.

- **GANs** : A very intuitive and introductory playlist for learning GANs.
- **GANs by ExplainingAI** : This playlist covers the maths behind GANs and also its implementation . (If you are done with the foundational GAN then you can see the 2nd video of DC - GAN)
- **Auto Encoders** : See the videos of this playlist from 6.1 to 7.6 to understand the math behind Autoencoders .
- **VAE** : An amazing playlist by Kapil Sachdeva for VAE starting from KL divergence to Reparameterization Trick. This playlist covers all the major components of VAE.
- **VAE Explainer** : A cool Visualization of VAE.
- **Implementation of VAE from Scratch** : An implementation of VAE from Scratch by Explaining AI .
- **VQ-VAE** : This is an additional resource if you are done with VAE (which i don't think you will be) then only try understanding this otherwise it may all go over your head .

Vision Transformers (Before this first complete the transformers part from the NLP track)

Vision Transformers are the computer vision counterpart to traditional Transformers used in natural language processing. Vision Transformers (ViT) brought recent breakthroughs in Computer Vision achieving state-of-the-art accuracy .

- **An Image is worth 16 * 16 words** : A paper reading session by Yannic Kilcher on the Vision Transformers paper by Google Brain Team
- **Explanation of Various Components of ViT** : These are the videos by Explaining AI on the various important components of ViT - [I](#) , [II](#) , [III](#)
- **Visualizing Attention** : This is a Medium Article on Visualizing the Attention maps for various classes . You must try out by training any ViT based model and then plotting their Activation Maps.

Assignment

Congratulations on completing this week resources . Now it's time to move on to the Assignment of this week which is going to be a very exciting one especially for CS:GO lovers.

AIM BOT DETECTION

The problem statement is to detect whether a player was using AIM BOT or not (Video based Binary Classification) using short clips of the CS:GO game play .

There are many ways of approaching this problem and you are free to exploring every possible method .

Project Description : This is an official description of this project that will give you an overview on how you can approach this problem and also regarding data collection .

We strongly encourage you to not just copy the method that they have used and try to apply an innovative strategy for this problem.

Submission Guidelines

- Create a GitHub repository named `<roll_number>-CSOC-IG` (e.g., 23014019-CSOC-IG)
- Repository organization:
 - A folder named `CSGO_model` containing all source code implementations
 - The final report in PDF format, authored using \LaTeX

Everything must be in the github repo itself.

- Submit the repository link via the provided Google Form [here](#)
- **Note:** The report constitutes the primary assignment submission. No additional files are required
- **Deadlines are strict and will not be extended**

Final Remarks

Ensure that your submission reflects a clear understanding of the concepts and methodologies applied. Focus on the analytical aspects and the rationale behind your implementations. We look forward to your insightful contributions.

That's it, complete these resources and you will be all ready for your amazing journey in this domain.

Hope you will give the resources and assignment your best shot—your future self will thank you!

Adios, and keep learning!