Master in Computer Vision Barcelona

Project Module 6 Coordination

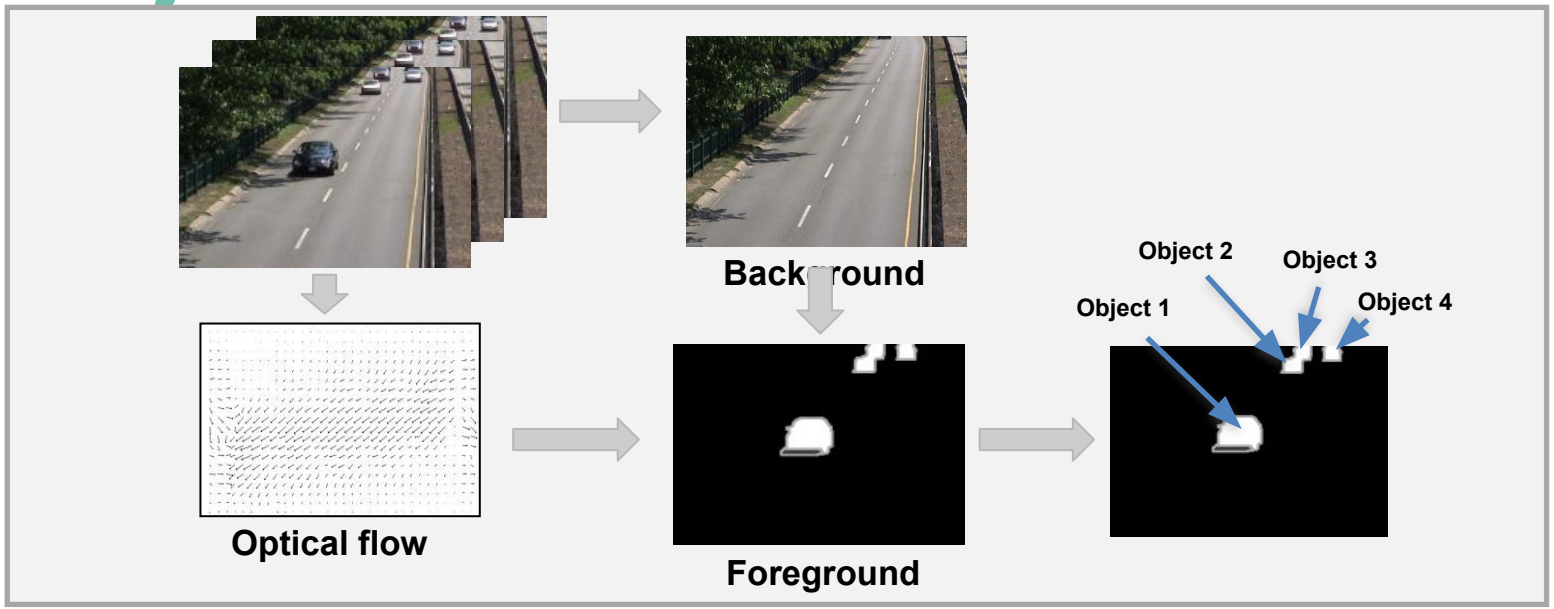
Week 5: Instructions
Academic Year 2021/2022

Video Surveillance for Road Traffic Monitoring

J. Ruiz-Hidalgo / X. Giró

j.ruiz@upc.edu / xavier.giro@upc.edu

Project Schedule



Week 1
- Introduction
- DB
- Evaluation metrics

Week 2
- Background estimation
- Stauffer & Grimson

Week 3
- Object Detection
- Tracking

Week 4
- Optical flow
- Video stabilization

Week 5
- Multiple cameras

Week 6
- Presentation workshop

Goal: Multi-target multi-camera tracking

CVPR 2020 AI City Challenge (Track 1)

Zheng Tang, Milind Naphade, Ming-Yu Liu, Xiaodong Yang, Stan Birchfield, Shuo Wang, Ratnesh Kumar, David Anastasiu, Jenq-Neng Hwang, "CityFlow: A City-Scale Benchmark for Multi-Target Multi-Camera Vehicle Tracking and Re-Identification" CVPR 2019.

Project grading

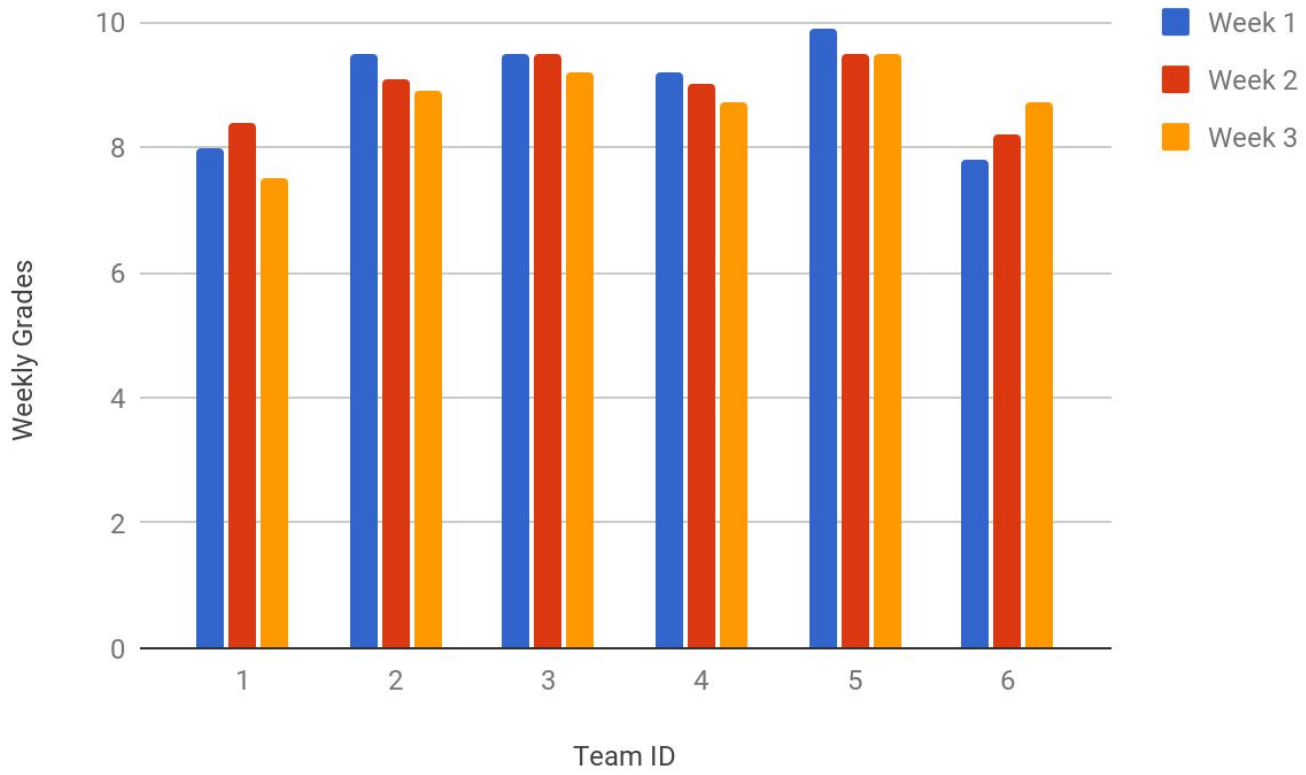
- The Project Development: PD
  - Weeks 1-4 (PD_i)
    - Delivered code + short presentation.
    - Completion of tasks and optionals
    - Feedback and questions to professors in class
  - Week 5 (PD_5)
    - Full code + short report
- Intra-Group Evaluation:
  - Every week students quantize the % of workload done by each member of the team
- Final project presentation: PP

- The final mark is

$$PP = 0.5 \cdot PP^{professor} + 0.5 \cdot PP^{students}$$

$$V = \sum_{i=1}^{4} 0.15 \cdot PD_i + 0.3 \cdot PD_5 + 0.1 \cdot PP$$

Previous Grades by Team



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Scoring rubric

Task		Weight
W5.T1	Multi-target single-camera (MTSC) tracking	2
W5:T2	Multi-target multi-camera (MTMC) tracking	5
W5.T3	Challenge submission	+4
W5.T3	Final deliverables	
W5.T3.1	Writing skills	2
W5.T3.2	Software on github repo	1

Data: CVPR 2022 AI City Challenge

Read the Data & Evaluation description for Track 1 (Multiple-camera tracking), but focus in the **single camera** set up.

- Data [3.3 GB]
  - Sequences S01, S03 and S04
    - Different cameras for each sequence.
  - Consider
    - Test sequence
      - Sequence S03
    - Train sequences (if needed)
      - S01 and S04

	Time (min.)	# cam.	# boxes	# IDs	Scene type	LOS
1	17.13	5	20,772	95	highway	A
2	13.52	4	20,956	145	highway	B
3	23.33	6	6,174	18	residential	A
4	17.97	25	17,302	71	residential	A
5	123.08	19	164,476	337	residential	B
total	195.03	40	229,680	666		

USAGE CONDITIONS

These data can only be used for the project in M6 in the Master in Computer Vision Barcelona 2021/2022.

You must delete these data once the module has finished.

T1.1: Multi-target single-camera (MTSC) tracking

Your technical report must include the IDF1 results of representative techniques explored during module M6.

	IDF1 (SEQ 3)						
Camera	**c10**	**c11**	**c012**	**c013**	**c014**	**c015**	**Average**
Technique 1							
Technique 2							
Technique 3							
...							
Technique N							

Use the implementation of IDF1 provided in py-motmetrics.

W5.T1.2: Multi-target single-camera (MTSC) tracking

If computation capability allows it, provide test results for SEQ 1 & SEQ 4, considering the other two as training data.

	Time (min.)	# cam.	# boxes	# IDs	Scene type	LOS
1	17.13	5	20,772	95	highway	A
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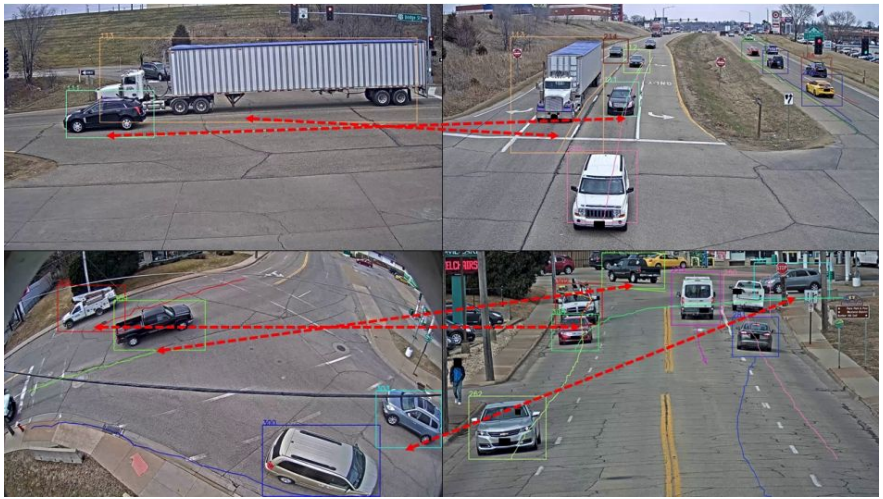
W5.T2: Multi-target multi-camera (MTMC) tracking

Assess the quality of your best solution on the CVPR 2022 AI City Challenge (Track 1):

“Participating teams will track vehicles across multiple cameras both at a single intersection and across multiple intersections spread out across a city. This helps traffic engineers understand journey times along entire corridors. The team with the highest accuracy in tracking vehicles that appear in multiple cameras will be declared the winner of this track. In the event that multiple teams perform equally well in this track, the algorithm needing the least amount of manual supervision will be chosen as the winner.”



W5.T2: Multi-target multi-camera (MTMC) tracking

Team 3 (2019)

W5.T2: Multi-target multi-camera (MTMC) tracking

W5.T2.1: Multi-target multi-camera (MTMC) tracking

Your technical report must include the metrics that will be used in the challenge:

Metric	IDF1	IDP	IDR	Precision (detection)	Recall (detection)
SEQ 3					
AVERAGE					

Use the metric implementations provided in py-motmetrics.

W5.T2.2: Multi-target multi-camera (MTMC) tracking

If computation capability allows it, provide test results for SEQ 1 & SEQ 4, considering the other two as training data.

	Time (min.)	# cam.	# boxes	# IDs	Scene type	LOS
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W5.T2.2: Multi-target multi-camera (MTMC) tracking

Your technical report must include the metrics that will be used in the challenge:

Metric	IDF1	IDP	IDR	Precision (detection)	Recall (detection)
SEQ 1					
SEQ 3					
SEQ 4					
AVERAGE					

Use the metric implementations provided in py-motmetrics.

W5.T2: Submission

E-mail xavier.giro@upc.edu if you run out of GCloud credit and we will try to obtain extra one.

- Subject: “[MCV M6 2022] Request for extra GCP credit for Team X”

Google Cloud

W5.T2: Multi-target multi-camera (MTMC) tracking

Tip: Check the repos and documentation from teams in 2019, 2020 & 2021.

2019

Team			
Team 1	Slides	Code	
Team 3	Slides	Code	Report
Team 4	Slides	Code	Report
Team 5	Slides	Code	Report
Team 6	Slides	Code	Report
Team 8	Slides	Code	Report

2020

Team			
Team 2	Slides	Code	Report.
Team 3	Slides	Code	Report
Team 4	Slides	Code	Report
Team 5	Slides	Code	Report
Team 6	Slides	Code	Report

2021

Team			
Team 1	Slides	Code	Report.
Team 2	Slides	Code	Report.
Team 3	Slides	Code	Report
Team 4	Slides	Code	Report
Team 5	Slides	Code	Report
Team 6	Slides	Code	Report
Team 7	Slides	Code	Report
Team 8	Slides	Code	Report

W5.T3: Challenge submission (optional)

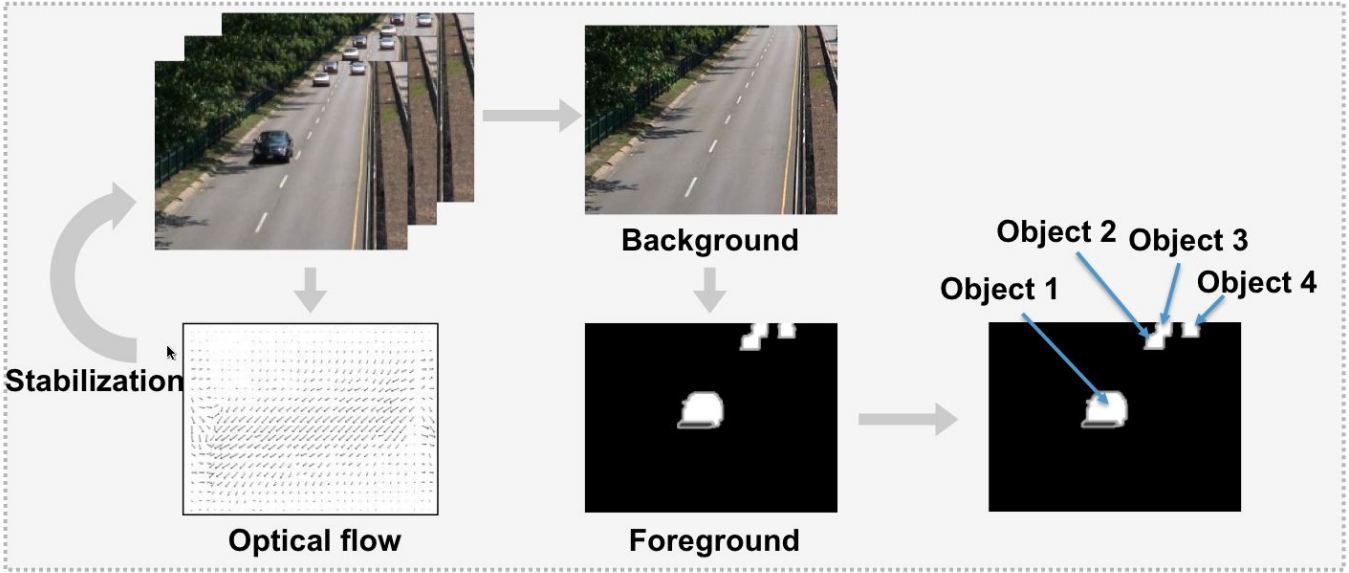
If you have been working on the task, you can try to solve the actual TEST task to participate in the challenge.

Results Deadline: 9th April 2022 :(

Workshop paper: 13th April 2022 :(

If you can process the data (?), send the results to Javier Ruiz and he will upload them to the official evaluation server.

Project Schedule

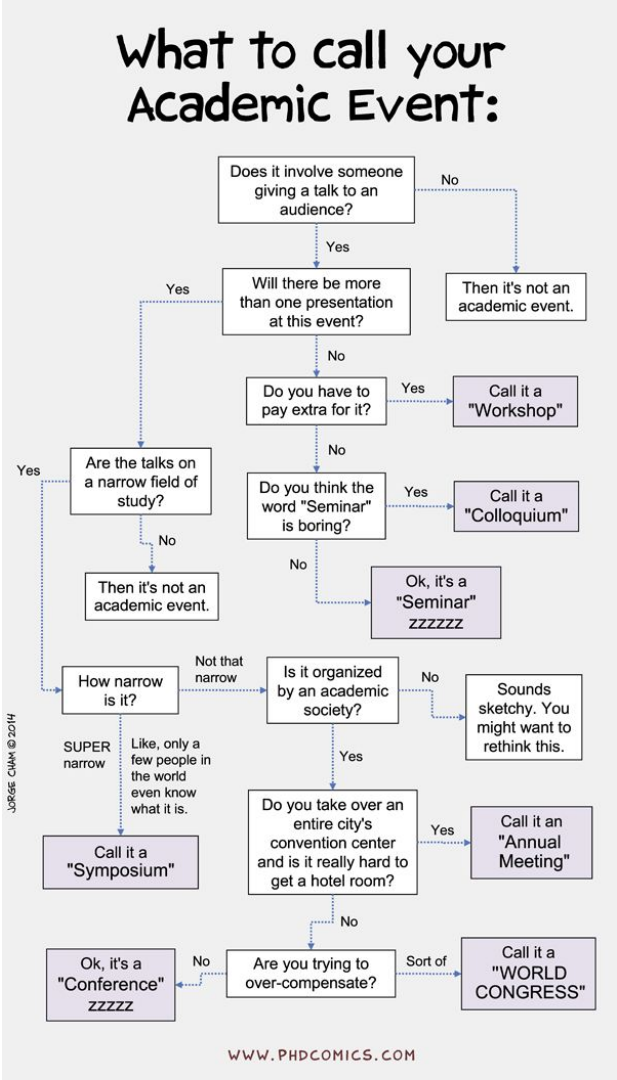


Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
•Introduction •DB •Evaluation metrics	•Background estimation •Stauffer & Grimson	•Foreground segmentation •Area filter •Hole filling •Shadow removal	•Optical flow •Video stabilization	•Region tracking •Kalman filter	•**Presentation**

Master in Computer Vision Barcelona

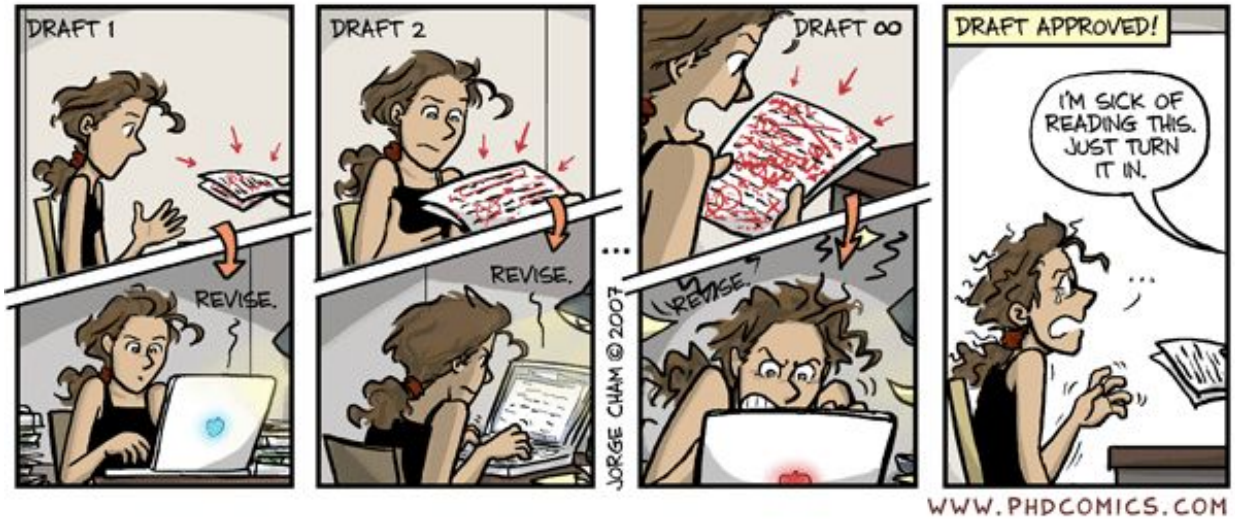
Final presentation

9th Workshop on “Road Traffic Monitoring”.



Paper submission

- Submit your 4-pages PDF following the [CVPR 2022 submission guidelines](#).
- Use online collaborative Latex editors (eg. [overleaf](#), [authorea](#)…)
- Release your paper in Creative Commons license to be published and distributed online.

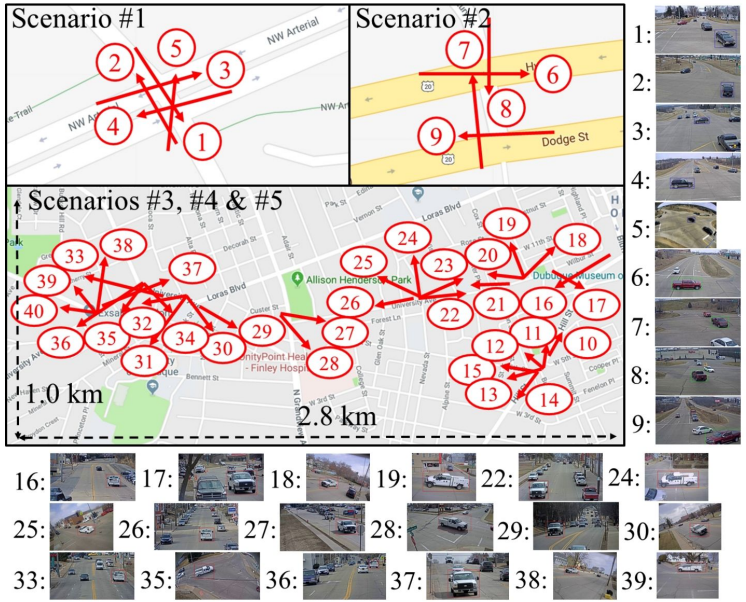


Paper submission

- Explain the complete system with:
  - Motivation
  - Related work
  - Your system
  - Evaluation
  - Conclusions
  - References.

Final deliverables

Read (and cite) the dataset paper:



Zheng Tang, Milind Naphade, Ming-Yu Liu, Xiaodong Yang, Stan Birchfield, Shuo Wang, Ratnesh Kumar, David Anastasiu, Jenq-Neng Hwang, "CityFlow: A City-Scale Benchmark for Multi-Target Multi-Camera Vehicle Tracking and Re-Identification" CVPR 2019.

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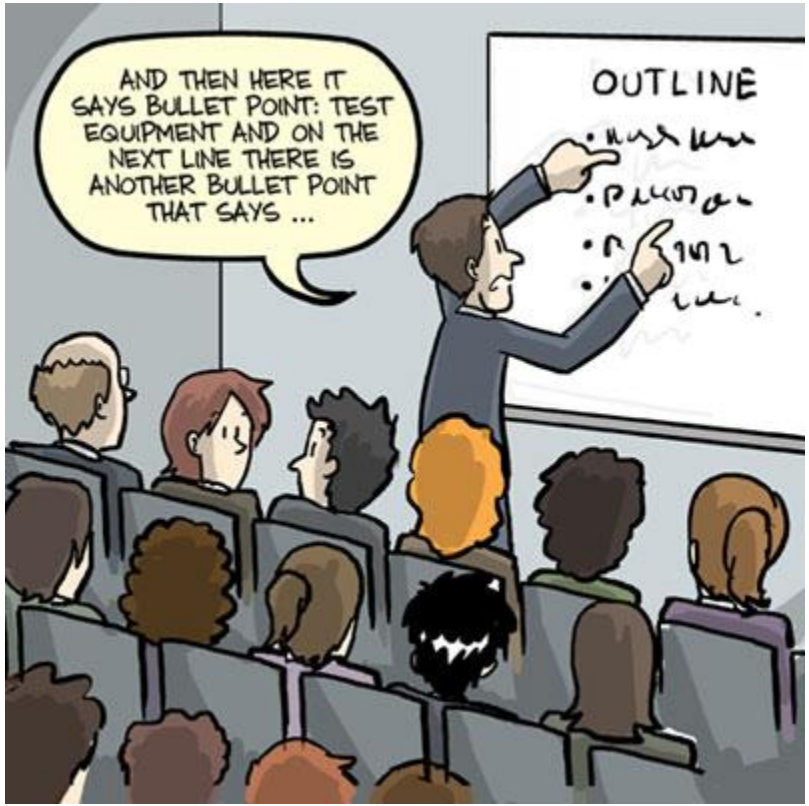
Oral presentation guidelines

Oral presentation of up to 10 minutes.



Oral presentation guidelines

DO's	DO NOT's
Look at the audience	Look at the screen or computer.
Speak aloud and clear (probably slowly)	Mumble or hurry up.
Adapt your speech to the audience	Pretend your audience are people who hear about the topic for the the first time.
Use your slides to illustrate your speech, these are not your notes.	Consider your slides are working notes to read. Audience will mainly listen to you, not read slides.
Number your pages.	
Help assessment by including the team ID and name of the each speaker at the slide footer.	
Deliver your presentation in a public GSlide + static PDF in repo.	Deliver a Microsoft PPT or Apple Keynote.

Deliverables

Deadline: Thursday 28th April 2022 at 4pm (presentation day):

- Set your Github repo to PUBLIC with an updated README.md describing your project.
- Source code on your GitHub repo.
- Slides linked from your README.md.
- Evaluation form for peers oral communication (at 7pm).

Deadline: Thursday 5th May 2022 at 6pm:

- Technical report on github & linked from your README.md.

Deadline: Friday 6th May 2022 at 6pm:

- Intra-group for Week 5 evaluation form.