

Topics in Geometric Modeling:

Point Cloud Segmentation

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Outlook

Two Modes

- Mode 1 (*Wednesdays*)
 - Lectures : L. Velho
 - Topics Course
 - ML-4-Visual_Computing
- Mode 2 (*Mondays*)
 - Meetings : F. Ganacim / D. Yukimura
(L. Velho)
 - Project RADIX
 - Point Cloud Instance Segmentation

Today

- About the Course
- Role-Playing Teamwork

The Course

Lecture Topics

Background + Discussions

- Neural Networks - Personal View
- Geometric Deep Learning
- Localization / Detection
- 2D / 3D Segmentation
- Attention + Transformers
- Panoptic Segmentation w/ Transformers
- Points and Meshes
- Self-Supervision

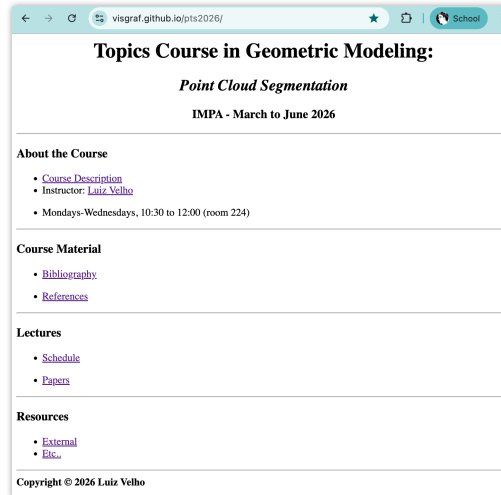
Paper Brainstorming

Study + Experiments

- Supervised
 - Mask3D
- Superpoints
 - SPT (Superpoint Tranformer)
- Open Vocabulary
 - OpenMask3D
- Self-Supervised
 - Segment3D
- * *Maybe Others*

Course Page

- For Your Eyes Only !



<https://visgraf.github.io/pts2026/> ➔

Role-Playing Paper Brainstorming

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Advanced Research Topics

- Evolve rapidly
 - Mask3D was published in 2023
- Papers become main references
- Need to find, read and study papers
- Learn how to read papers technically

Paper-Reading is Important

- In basic courses we usually have a textbook
 - Introduction to XXXX
- Advanced topics often have no textbooks:
 - Semantic Segmentation
 - Neural Geometric Modeling
 - (Gaussian Splatting)
- We must study research papers (*in a New Way!*)

Role-Playing Paper-Reading Sessions

- Inspired by geometry and animation seminars at the University of Toronto.
 - Organized by Alec Jacobson.



Role-Playing Paper-Reading Seminars
Alec Jacobson, Colin Raffel
Pedagogy Report 2021
[Blog post](#) | [PDF](#)

Key Innovations

- One-To-Many vs. Many-To-Many
- Role-Playing based on Structure
- Begin-to-End Group Dynamics

One-To-Many (*old way*)

Missed Opportunities

- Often without feedback
- Need For:
 - Learning to review papers
 - Reproducing results
 - Generating new ideas



Many-To-Many (*new way*)

- Everyone studies the same paper
- Different roles
- Different perspectives
- More engagement



Training Presentation Skills

- Many-to-Many format
 - Improve Scientific Communication
 - Stimulate Critical Discussion
 - Promote Engagement



Technical Reading

Learn How to Read a Paper

- Problem
- Related work
- Method
- Results
- Evaluation

Structure



How to Read a Paper ?

- Related Work (Context)
 - List Important Papers
 - Classify the References
- Key Ideas (Concepts)
 - Principles
 - Methods
- Contribution
 - General Overview
 - Components on Detail
- Evaluation
 - Datasets
 - Ablations

Five Roles

Related to Paper Structure



Reviewer



Archaeologist



Hacker



PhD Student



Critic

Reviewer

- Full CVPR-style review
- Accept 😊 or Reject 😈
- Structure Report



Reviewer: Evaluation

- CVPR Guidelines



Summary:

Explain the key ideas, contributions, and their significance.

This is your abstract of the paper.

The summary helps the AC and the authors understand the rest of your review and be confident that *you* understand the paper.



Strengths:

What about the paper provides value? -- interesting ideas that are experimentally validated, an insightful organization of related work, new tools, impressive results, something else?

Most importantly, what can someone interested in the topic learn from the paper?



Weaknesses:

What detracts from the contributions?

Does the paper lack controlled experiments to validate the contributions? Are there misleading claims or technical errors? Is it possible to understand (and ideally reproduce) the method and experimental setups by reading the paper?



Rating and Justification:

Carefully explain why the paper should be accepted or not.

This section should make clear which of the strengths and weaknesses you consider most significant.



Additional comments:

Minor suggestions, questions, corrections, etc. that can help the authors improve the paper.

Not crucial for the overall recommendation.

Archaeologist

- Historical context
- Prior and later work
- Relationships



PhD Student

- New research project
- Enabled by the paper



Hacker

- Fast demo
- Reproducibility
- Simplified Implementation



Supervisor / Critic

- Coordinate Peers Progress
- Evaluate Presentation Strategy
- Suggestions for Future Improvement



Group Dynamics

- Individual Paper Reading
 - Focus on Roles (Starting Now)
- Peer to Peer Discussions
 - Slack Direct Messages
- General Brainstorming
 - Slack Channel per Paper

Presentation and Discussion

- Presentation
 - Structured by roles
 - 60 minutes max
 - Balanced role assignment
- Discussion
 - 30 minutes

Final Report

- Section Structure:
 1. Review
 2. Archaeology,
 3. Code & Experiments,
 4. Future Work,
 5. Conclusions

Closing Words

Homework

- Todo List:
 - Discuss Teamwork
 - Gather Paper Materials
 - Start Reading the Papers
 - Begin Interaction on Slack