Video Assignment for COMP4880/8880

The video assignment is an **individual assignment**. Each student is expected to upload a **4-8 minute-long** video talking on **one** technical topic in and around Network Science.

The goal for the video assignment is to encourage you to go from textbook material to (not-so-recent) research literature, including theory, model, algorithms as well as applications to a range of problem domains. This is an opportunity to demonstrate your critical thinking skills, the ability to synthesize technical information, potentially apply what you learned to new problems and mathematical settings, and to communicate complex technical knowledge effectively.

A selected subset of well-made videos will be invite to participate in a showcase to the whole class.

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- Three Candidate topics
  - Some tips about the video content (also see *Grading Criteria* below):
- Instruction for producing the video
  - Identification requirements
  - Length requirement and penalty
  - Video content tips
  - Submitting your video assignment
- Grading Criteria
  - Show The Key Content (7.5 points)
  - Show Your Understanding (7.5 points)
  - Show Your Creativity (5 points)

Three Candidate topics

- (**Heavy tails in large networks**) This topic explores the litearature behind "do we see power-law distributions?" by estimating heavy tail distributions from empirical data (Broido and Clauset) and different mechanisms that could generate the internet graph (Willinger et al). A student video can choose to focus entirely on (Broido and Clauset), or focus on (Willinger et al) mentioning the relevant background in (Broido and Clauset).
  - Anna D. Broido, and Aaron Clauset. "Scale-free networks are rare." Nature communications 10, no. 1 (2019): 1017. https://www.nature.com/articles/s41467-019-08746-5
  - Walter Willinger, David Alderson, and John C. Doyle. "Mathematics and the internet: A source of enormous confusion and great potential." Notices of the AMS 56, no. 5 (2009): 586-599. https://www.ams.org/notices/200905/rtx090500586p.pdf
- (**Self-exciting and epidemic processes**) This topic is related to the discussion on harzard rates and "residual life" in week4. The first paper proposes a model inspired by a known hazard rate function, and uses it to explain the popularity of YouTube videos. The second paper establishes a connection between self-exciting processes and epidemic models. If you choose this topic, the suggestion is that you focus most of the effort on either (and preferrably not both) paper. Ideas for creative questions that can be asked and answered will be in the corresponding lecture.

    - Marian-Andrei Rizoiu, Lexing Xie, Scott Sanner, Manuel Cebrian, Honglin Yu, and Pascal Van Hentenryck. "Expecting to be HIP: Hawkes intensity processes for social media popularity." In Proceedings of the 26th international conference on world wide web, pp. 735-744. 2017. https://arxiv.org/abs/1602.06033
    - Quyu Kong, Marian-Andrei Rizoiu, and Lexing Xie. "Modeling information cascades with self-exciting processes via generalized epidemic models." In proceedings of the 13th international conference on web search and data mining, pp. 286-294. 2020. https://arxiv.org/abs/1910.05451
- (**GNN representation**) Graph Neural Networks (GNNs) has been a powerful and practical tool for learning relations from data. Widely applied to data from the internet, physical sciences, drug discovery, and many more. (Xu et al) is an influential work with a conceptual framework to think about representations learned by GNN. You may find the short tutorial by Huang and Villar helpful for understanding some of the graph preliminaries.
    - How Powerful are Graph Neural Networks?, Keyulu Xu, *Weihua Hu*, Jure Leskovec, Stefanie Jegelka, ICLR 2019, https://openreview.net/forum?id=ryGs6iA5Km
    - Huang, Ningyuan Teresa, and Soledad Villar. "A short tutorial on the weisfeiler-lehman test and its variants." In ICASSP 2021-2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), pp. 8533-8537. IEEE, 2021. https://arxiv.org/abs/2201.07083

Going outside of these options will mean that your topic is less supported and less calibrated in grading. This course supports ANU Advanced Studies Extension (ASE) in the PhB program. **If you feel compelled to cover a topic outside of the above list, please get approval from course staff via Ed a few weeks before the video assignment due date** with a rationale for creating your own topic and the perceived intellectual merit of the topic (it can range from theoretical, algorithmic, empirical, or some combination of these). We aim to provide feedback on your topic, and gauge the capacity available for grading.

Notes on topic choice and support:

(1) For the small number of suggested topics above, the course staff will host a walk-through session during one of the lectures, followed by Q&A (in person and on discussion forum). For student-nominated topics support is more limited: during instructor and tutor contact hours, and on discussion forums.

(2) The grades for assignments based on the suggested paper list will be compared and moderated relative to one another. A topic that you create will be scored using the criteria below, but could be less calibrated with the rest of the class due to the uniqueness of the topic.

Some tips about the video content (also see *Grading Criteria* below):

- The intended audience for your video should be an average student in this class (i.e. your peers) who is busy with other coursework. You can assume they have exposure to the topics covered in network science but may not remember in detail, therefore key details need to be refreshed and reinforced.

- During grading, tutors think highly of expositions that go beyond repeating what is in the paper or textbook, and provide insights behind the basic figures. That is to say, explanations that reveal "what this really means" and "how A is different/connected to B" are highly valued. Hopefully your ANU program (including this course) has equipped you with the prerequisite knowledge and critical thinking skills to do this. The video assignment is your opportunity to demonstrate these skills, whereas more traditional assignments and exam are mainly intended to examine students' ability to "solve problems".
- A few ideas for creativity
    - ask a creative variant of the question different from what was asked.
    - present a creative version of the solution different from the solution provided in the paper.
    - to creatively interpret the results explore why something did or did not work.
    - make well-reasoned claims about how others can use the knowledge created in this paper, has this work been adopted and extended by other people (and if yes, how), or how you might use this to answer a question (that is new, fun, useful, or a bit unexpected)
    - a creative presentation can include new diagrams, figures, animations or anything you like to help explain the technical content.

Instruction for producing the video

The submitted video is **required** to have a talking person (you) in view synchronized with the spoken content. This requirement has two goals, the first is to make your video more engaging, the second is to establish identification (i.e. verify that you are the one who produces and presents in the video).

There are many methods for recording yourself with a presentation. One easy way is to can have a recorded Zoom or Microsoft Teams meeting with you as the only participant. Students are free to use more advanced production techniques if desired.

Two commonly used way to record your video are:
- using a presentation software (PowerPoint, Keynote, OpenOffice etc) with your presentation slides, and share screen or
- using a camera to show your handwritten equations, either on paper or whiteboard.

Identification requirements

- The submission system asks you for a selfie with your ID (ANU ID or another form of ID)
- Your face must be visible and identifiable in the picture.
- You must present your student ID card to the camera with sufficient detail to read your name and UNI ID. For your own protection, do not to show the barcode or ID number.
- **Failure to provide an identification in a way that is verifiable against the video content will result in 0 mark for the entire video assignment**.

Length requirement and penalty

- The length of the video should be between 4 to 8 minutes, with an under- and over- length penalty being 1 point per 10 seconds (or part thereof).

Video content tips

We recommend clearly stating the question you selected at the beginning of your video, and make the structure of your presentation clear. Read the *Grading Criteria* below carefully, which guidance for designing your presentation.

The forms of visual aids in the presentation can include, but are not limited to hand-written sheets of paper, slides, illustrations, code, mind maps, whiteboard illustration, solution step summary, informative drawing, etc. We recommend one or a few forms of visual aid for making your point, rather than over-crowding the presentation.

Submitting your video assignment

Submission is completed via the "Video Assignment" entry on either Wattle or Gradescrope.
[EXACT SUBMISSION INSTRUCTION WILL BE UPDATED AND POSTED ON ED]

Grading Criteria

Show The Key Content (7.5 points)

Students are expected to summarise the key content of the paper in a clear and easy-to-follow way. Here the key content include the main research question, the approach taken, new contributions of this work, empirical or theoretical results, and implications.
The marking criteria including technical correctness and clarity of presentation.

- 6-7.5: Student shows a clear and accurate solution, with a high-quality illustration.
- 5: Student shows a clear and accurate solution.
- 1-4: Most of the content is clear and the illustration is understandable. Some explanation is unclear or inaccurate. One mark penalty for each mistake.
- 0: Most of the presentation is not clear enough and the main idea is hard to follow.

Failure to reference material produced by others will result in a loss of 1-3 marks.

Show Your Understanding (7.5 points)

Students are expected to show not only the solution, but also a high-level understanding of it.
For example, what does the equation/coding mean and why it is useful, what can you learn from solving the question, how does it relate to what we learned in the lecture, how do different parts of the network class relate to each other.
Any other contents showing your understanding are welcomed.
If you choose a relatively simpler topic, you are expected to show a deeper understanding.

- 5-7.5: The presentation shows a deep understanding of the question and solution. The understanding is logical and accurate.
- 2-4: Student shows understanding but has problems such as, understanding unilateral and simplification, logic confusion and so on.

- 0-1: The presentation includes little understanding of the solution or the understanding is inaccurate.

Show Your Creativity (5 points)

Students are encouraged to show creativity in the video presentation.

One can show additional technical depth by clearly presenting materials beyond what was covered in this class, for example, give fresh perspectives on top-quality recent research related to the assignment questions; design extra experiments to show ideas related to the assignment questions, discuss insights on the pros and cons for the model (with concrete examples).

One can **alternatively, or simultaneously** show creativity for the presentation form. Examples include, but are not limited to creative visual aid, creative verbal and visual performance.

- 5: The creative ideas are above-and-beyond.
- 3-4: Student shows a high level of creativity. The creative ideas are well explained.
- 1-2: Student shows some level of creativity. Some of the creative ideas are not clear.
- 0: The presentation does not show creativity or creative ideas are poorly presented.

Note that without creative and deeper understanding of the content, the total mark is capped at 16/20.