Computer Vision and Its Applications

(in Home Video Surveillance)

WHAT WILL BE COVERED?

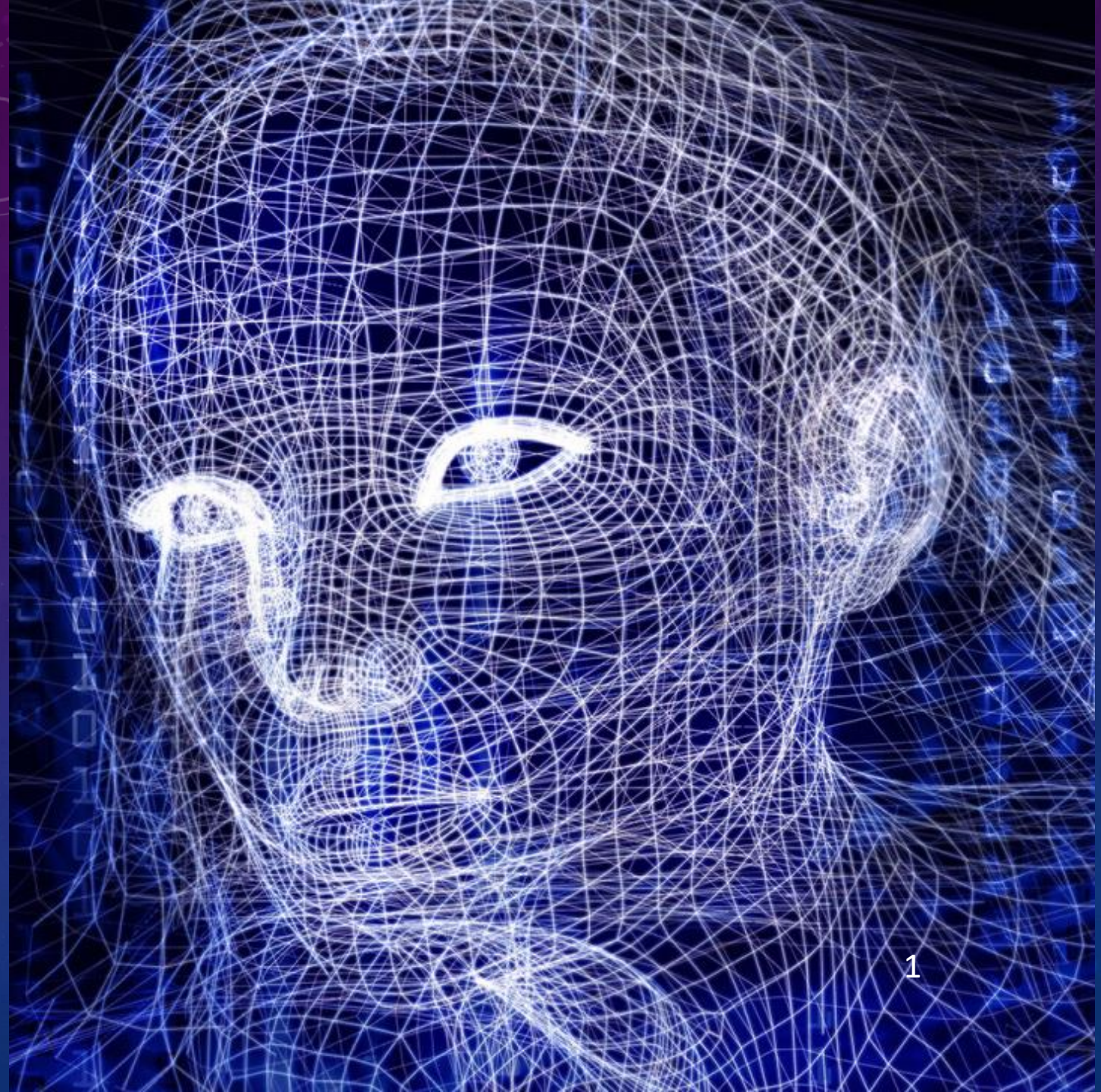
ANY BACKGROUND REQUIRED?

GRADING?

徐繼聖

Gee-Sern Jison Hsu

National Taiwan University of Science and Technology



About Me and My TAs

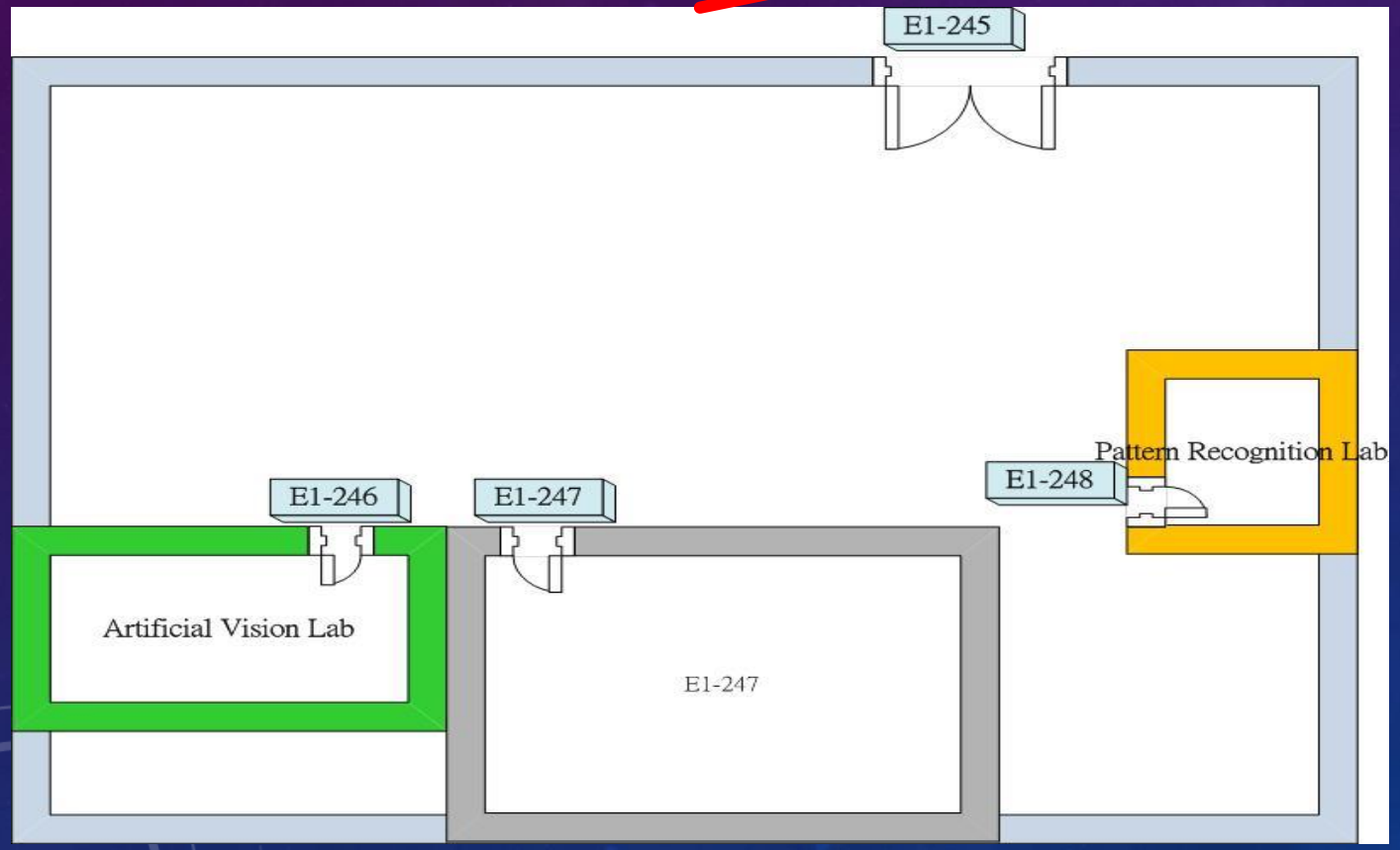
Jison G.S. Hsu, E1-445, Ext. 3234

- My interests: computer vision and machine learning
- https://sites.google.com/site/jisonhsuprofile2/
- Office hours (OH): 14:30~15:30 on Wednesday
- jison@mail.ntust.edu.tw

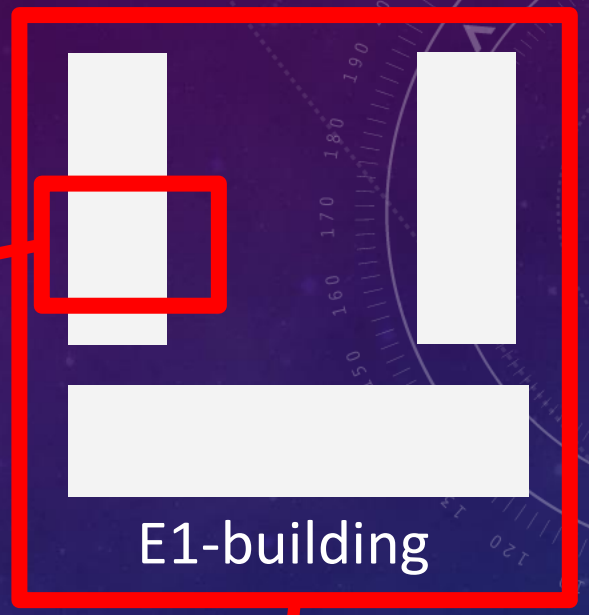
TA:

- E1-248, E1-246 Ext. 7246 or 3738 , preliminary OH: 13:00~15:00 Friday.
- Josh: D10803002@mail.ntust.edu.tw
- Max: M10803419@mail.ntust.edu.tw

Pattern Recognition Lab at E1-248



E1-245

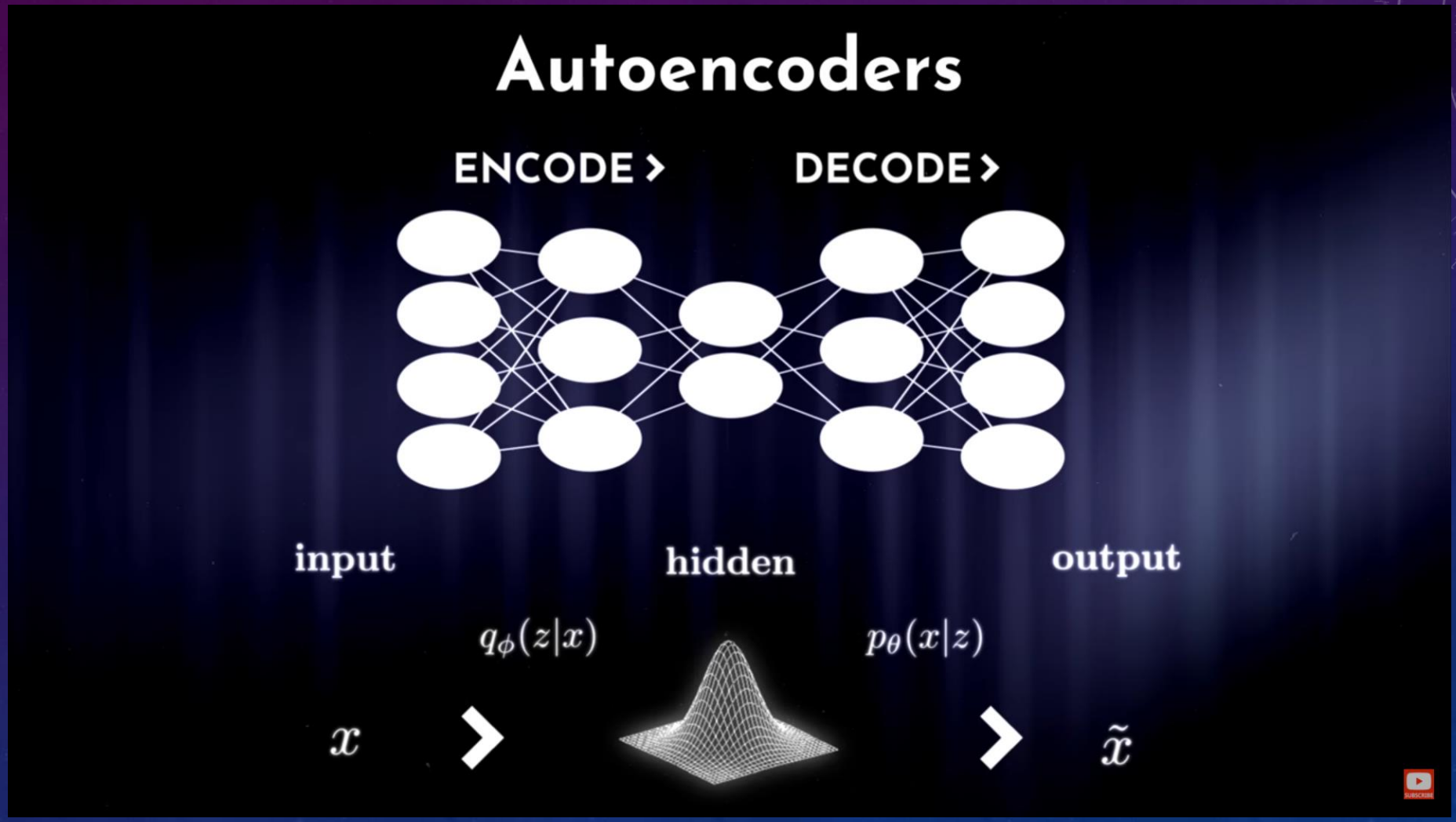


NTUST Campus

Focus of this Course: GAN

https://www.youtube.com/watch?v=-Upj_VhjTBs&feature=emb_logo [3:54]

Generative Modeling Applications



https://www.youtube.com/watch?v=FZBFV7xfGaY [12:28]

Lecture 13 | Generative Models

https://www.youtube.com/watch?v=5WoItGTWV54 [1:17:40]

More recommendations about CV and GANs:

- FeiFei Li, Researcher from Stanford
https://www.youtube.com/watch?v=40riCqvRoMs

- Computerphile Channel from YouTube:
https://www.youtube.com/watch?v=Sw9r8CL98N0&t=1017s

- 2 Minute Papers: Face Swapping GAN
https://www.youtube.com/watch?v=duo-tHbSdMk

Deep Learning for Computer Vision (1/2)

- Introduction to Convolutional Neural Network (CNN) and Deep Learning
  - Youtube : What is Neural Network? – 3BLUE1Brown and others
  - Materials from DSS (Digital Surveillance Systems)
  - Exercises from PyTorch Libraries and Colab
- Fundamentals on Encoder and Decoder
  - Auto Encoder
  - Deep Convolution GAN (DCGAN)
- Coding Exercises
  - Python https://www.youtube.com/watch?v=mpnBNGOSplA
  - Githubs, https://github.com/
    - labelme (Segmentation) https://github.com/wkentaro/labelme
    - labelImg (Bounding Box) https://github.com/tzutalin/labelImg
  - MATLAB https://www.youtube.com/watch?v=LcIJuVSAxL4

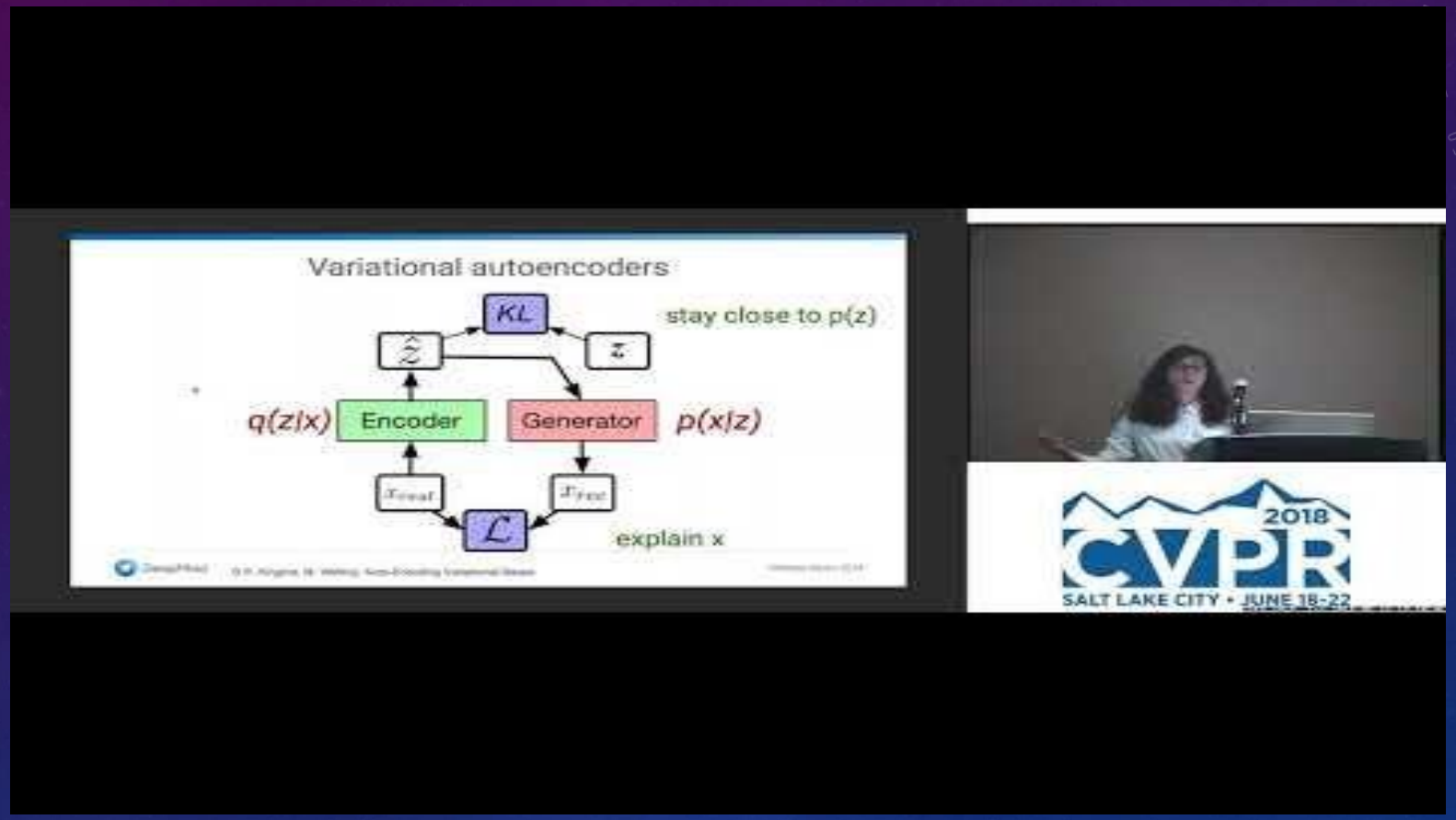
Deep Learning for Computer Vision (2/2) – The GAN-Zoo

- CycleGAN
  - Youtube: https://www.youtube.com/watch?v=lCR9sT9mbis
  - Github: https://github.com/junyanz/CycleGAN
- DR-GAN https://www.youtube.com/watch?time_continue=2&v=IjsBTZqCu-I&feature=emb_logo
- Conditional GAN to create Anime Characters (AnimeGAN)
  - homepage: https://make.girls.moe/#/
  - paper: https://arxiv.org/pdf/1708.05509.pdf
  - github: https://github.com/m516825/Conditional-GAN
- Image-to-Image Translation with Conditional Adversarial Nets
  - Two Minute Paper Channel: https://www.youtube.com/watch?v=u7kQ5lNfUfg, source code: https://phillipi.github.io/pix2pix/
- Progressive GAN, Face Generation: https://www.youtube.com/watch?v=XOxxPcy5Gr4
- StyleGAN v2. Style transfer: https://www.youtube.com/watch?v=9QuDh3W3lOY
- Head Reenactment: https://www.youtube.com/watch?v=st3YdiTIVtc
- Further read: https://medium.com/@jonathan_hui/gan-some-cool-applications-of-gans-4c9ecca35900

Python Tutorial for Beginners

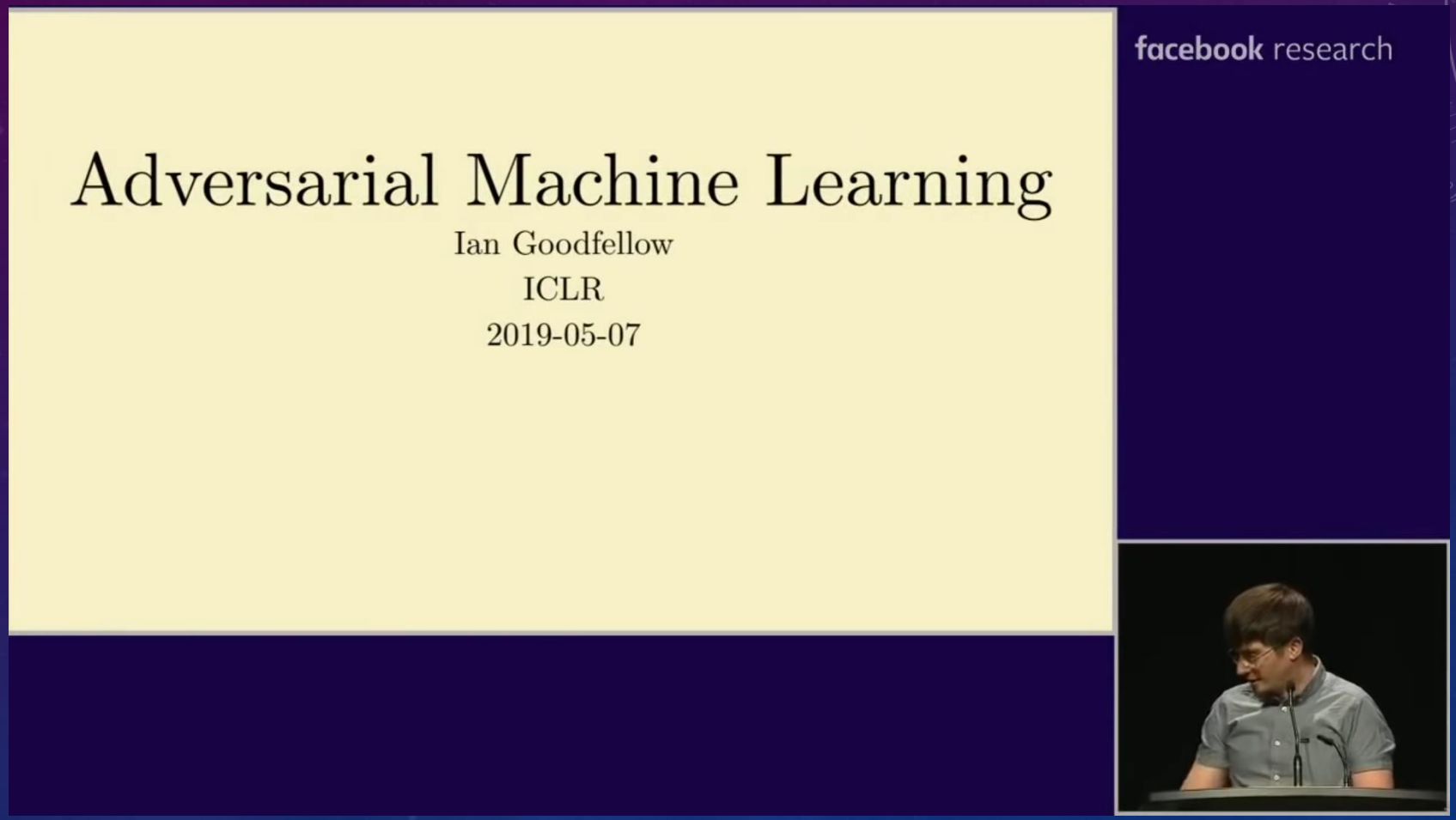
https://www.youtube.com/watch?v=mpnBNGOSplA [08:21]

CVPR Tutorial：Variational Autoencoders and GANs



https://www.youtube.com/watch?v=5R28W5FnSxM [1:33:59]

Introduction to GANs, ICLR 2019 | Ian Goodfellow



(58) Ian Goodfellow: Adversarial Machine Learning (ICLR 2019 invited talk) – YouTube
[43:06]

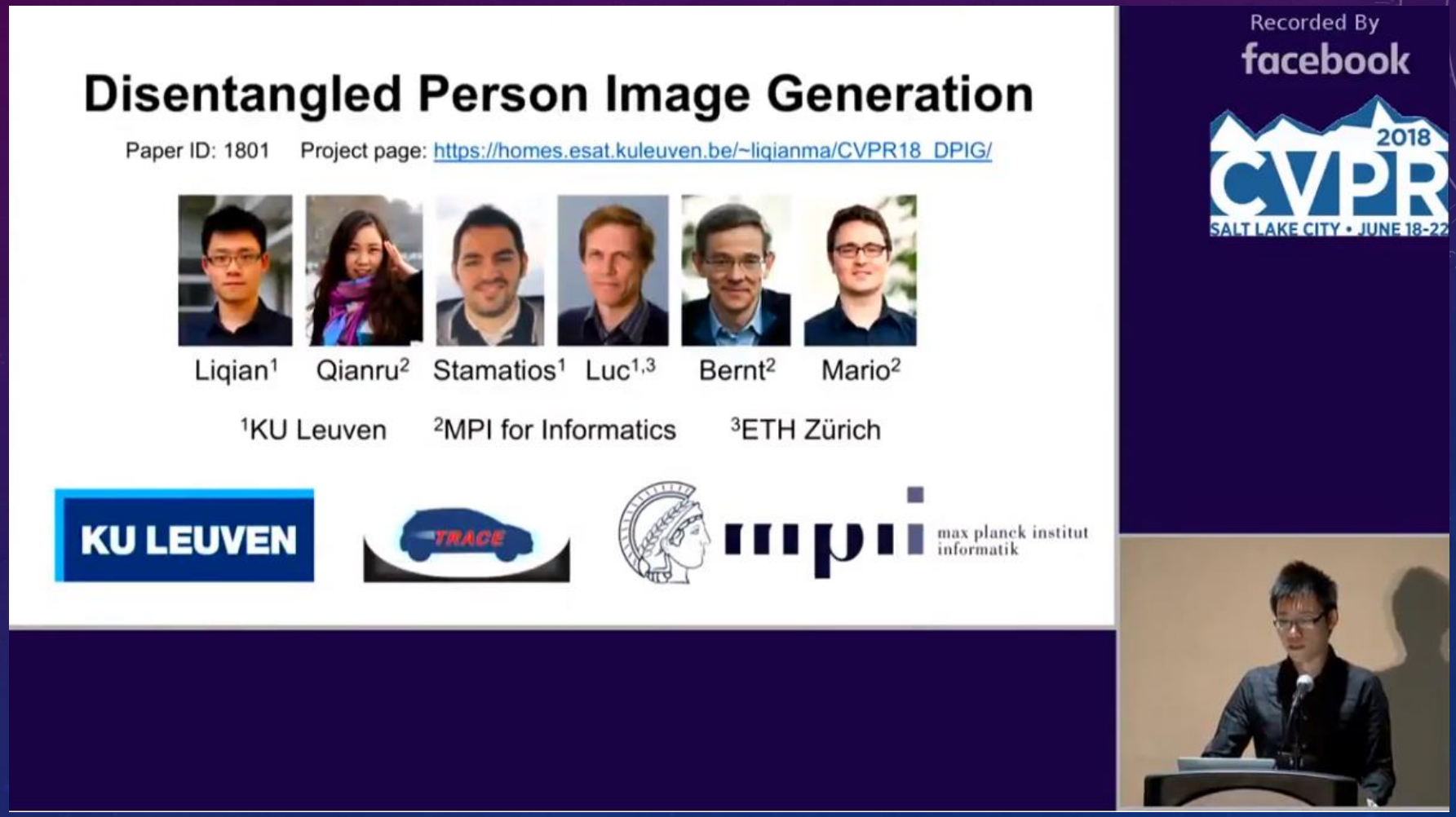
How Are You Graded?

- Quiz for CNN (in class, March 16) ---------- 10%
- Project Mid-term Presentation (in class April 13)---------- 20%
- Exam (120~150 mins on May 25) ---------- 30%
- Project Final Presentation (in class June 15) ---------- 20%
- Exercises and Homework ---------- 20%

Presentation and Problem Solving Skills

- All topics are delivered with references collected from the web, and many are from YouTube, e.g., CVPR/ICCV/ECCV tutorials
- The course materials will be available on Moodle
- You will form a study group of 2 teammates. Please submit your team members by March 16.
- We will assign each team a problem, and you have to solve it with your team. Your problem, on-going progress and solution will be presented in the mid-term and final presentations.
- Refer to *CV_Project_Group_Introduction.pdf*

Presentation Example



https://www.youtube.com/watch?v=vy2KgNdVRfo [04:01]

Movies Menu

- https://youtu.be/aircAruvnKk 3Blue1Brown series1
- https://youtu.be/IHZwWFHWa-w 3Blue1Brown series2
- https://youtu.be/Ilg3gGewQ5U 3Blue1Brown series3
- https://youtu.be/tIeHLnjs5U8 3Blue1Brown series4
- Python, https://youtu.be/rfscVS0vtbw
- GAN by Pytorch, https://youtu.be/xjdMgerRxWs
- Stanford Lecture13 – Generative Models: https://www.youtube.com/watch?v=5WoItGTWV54
- https://youtu.be/EPAIUW_A4sU (Chinese) GAN PyTorch Tutorial
- https://youtu.be/DQNNMiAP5lw GAN by Hung-yi Lee(李宏毅)
- https://youtu.be/qbW-X6iW5jE Deep Learning Basics: Introduction and Overview
- https://youtu.be/YJnddoa8sHk Deep Learning: Practice and Trends
- https://youtu.be/O5xeyoRL95U (good for 1st time)

Attention

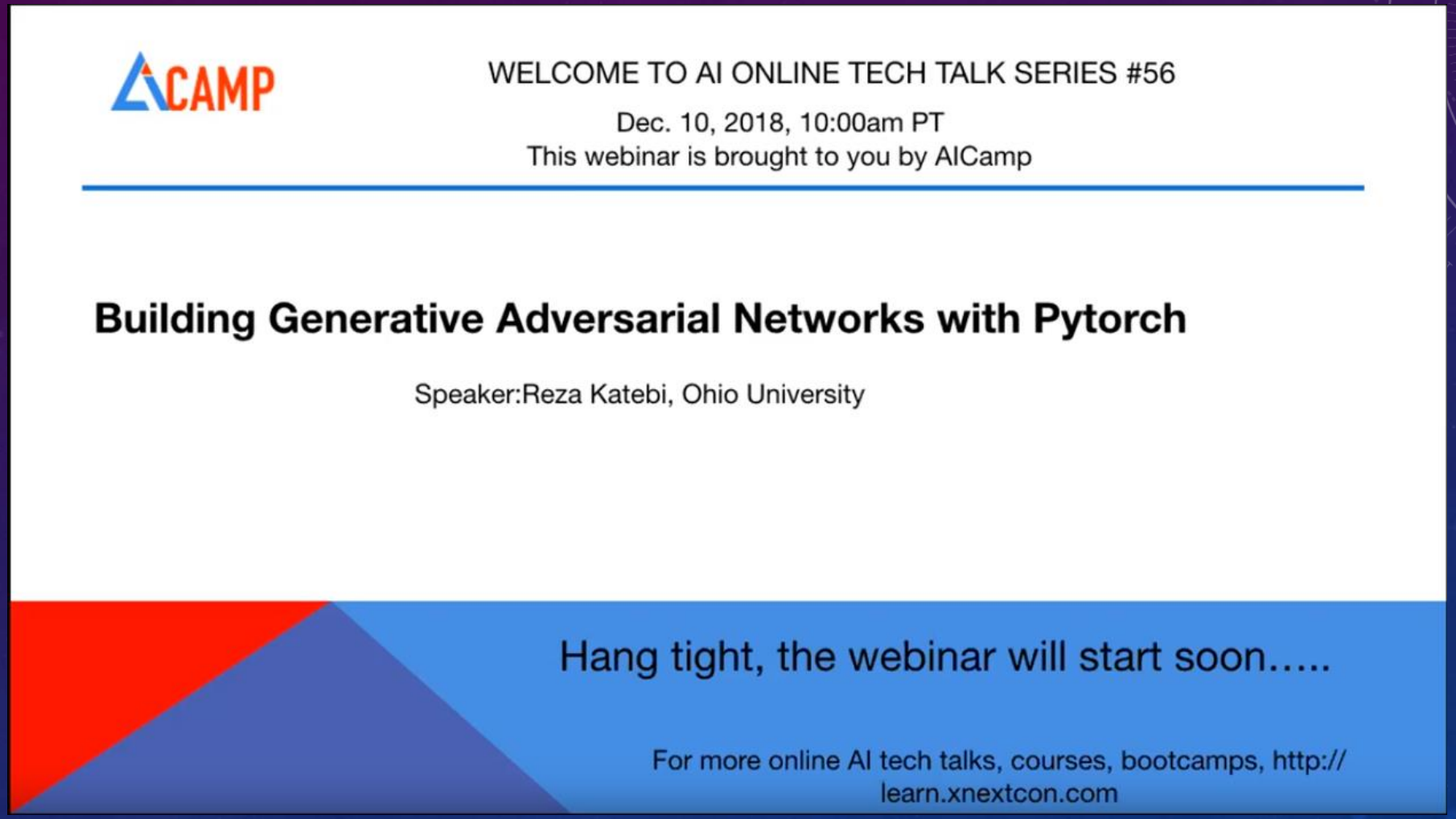
The class on March 2 (next Tuesday) will begin at 13:20 as I am requested to join a meeting at the College of Engineering at 12:30.

Supplementary Materials

Learning Python - Beginners Tutorial

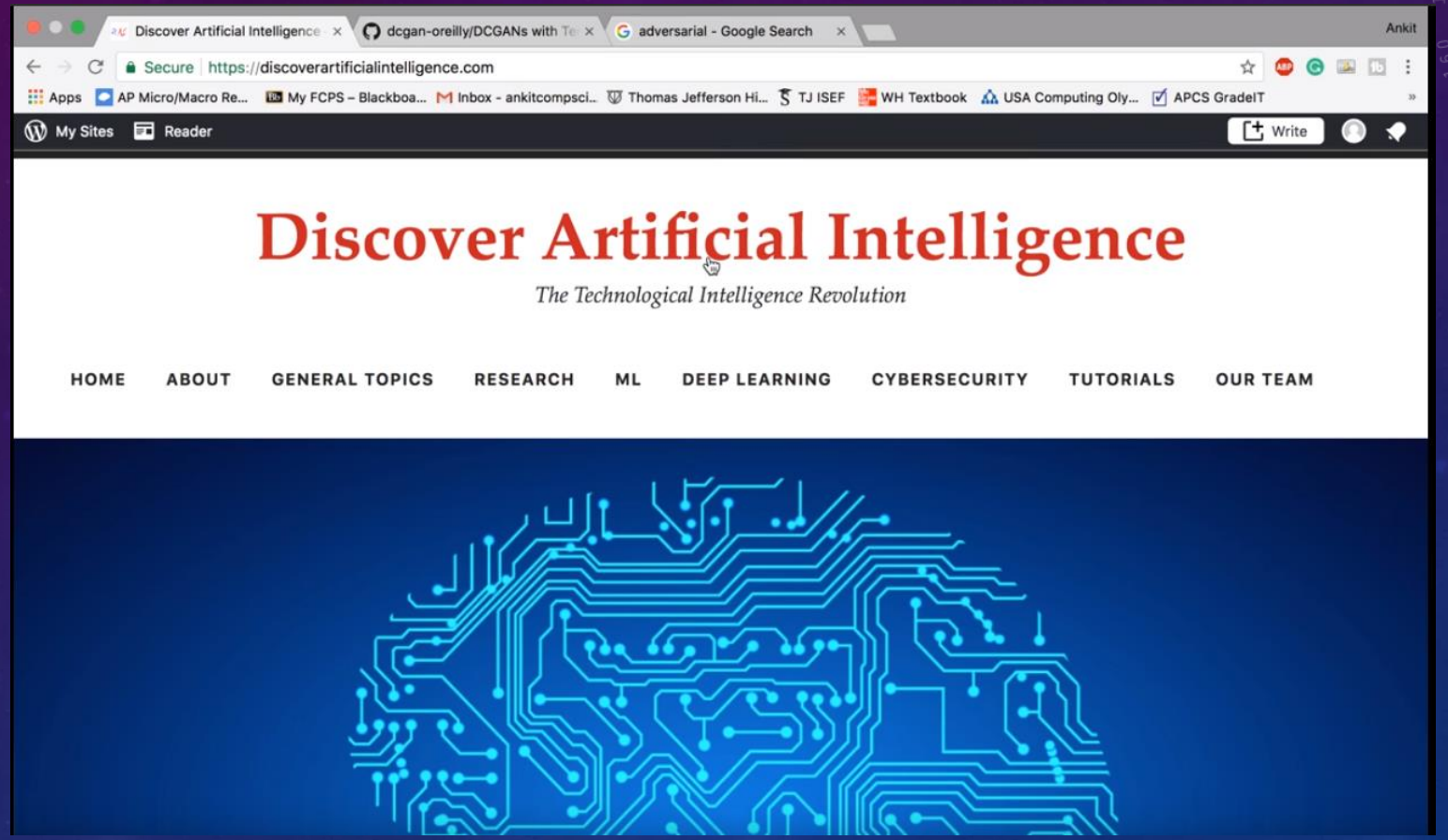
https://youtu.be/rfscVS0vtbw [4:26:51]

Building Generative Adversarial Networks with Pytorch



https://youtu.be/xjdMgerRxWs [1:00:07]

Make a Face Generative Adversarial Network in 15 MINUTES!



https://youtu.be/qbW-X6iW5jE [16:23]

#4.6 GAN (PyTorch tutorial) (Chinese)

https://youtu.be/EPAIUW_A4sU [15:21]

GAN Lecture 1 (2018): Introduction (Chinese)

https://youtu.be/DQNNMiAP5lw [1:33:14]