Bayesian Deep Learning:
Course Logistics

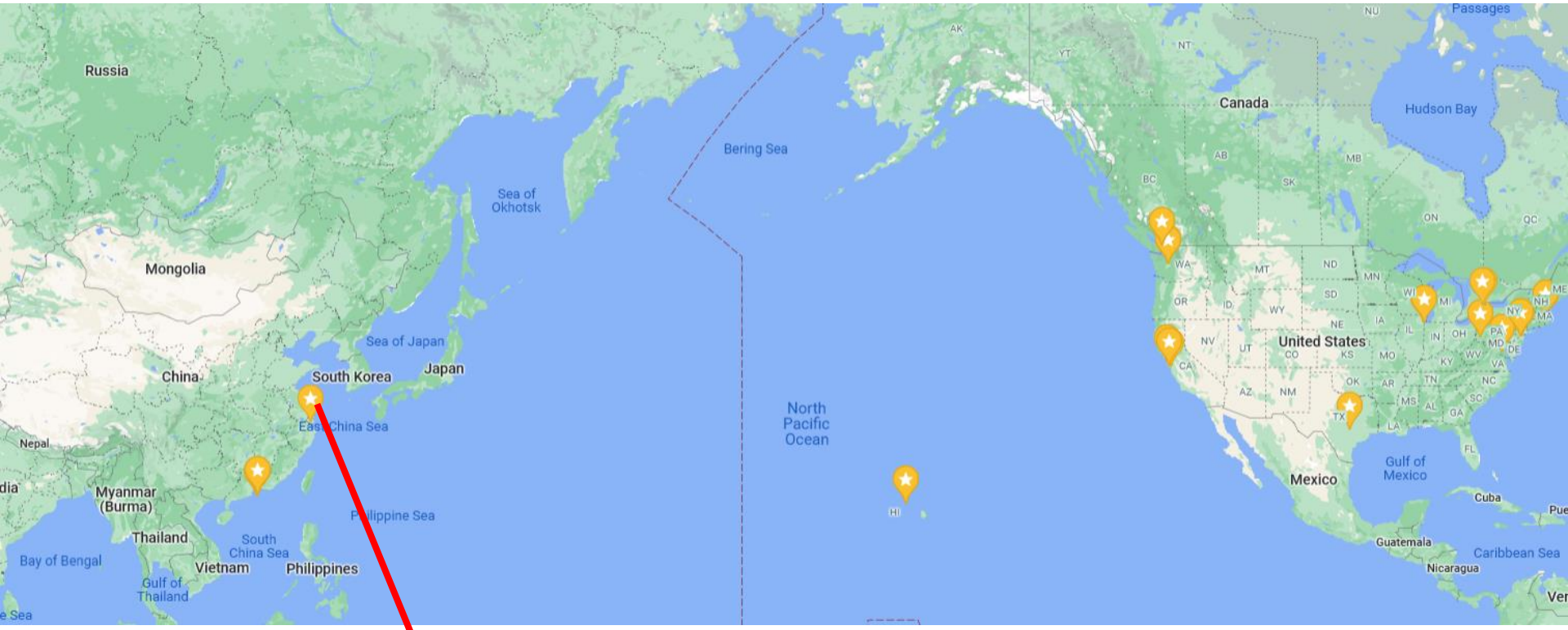
Hao Wang

RUTGERS
UNIVERSITY | NEW BRUNSWICK

Course Goals

- Establish broader view of ML and DL
- Uncover key challenges and research opportunities
    - Methods, Applications, Theories
- Identify connections between fields and disciplines
    - Statistics, CS, Math, Various Applications
- Push the boundary of one field through the final project
- Graduate the course ready to do research
    - ML, DL, including Bayesian DL

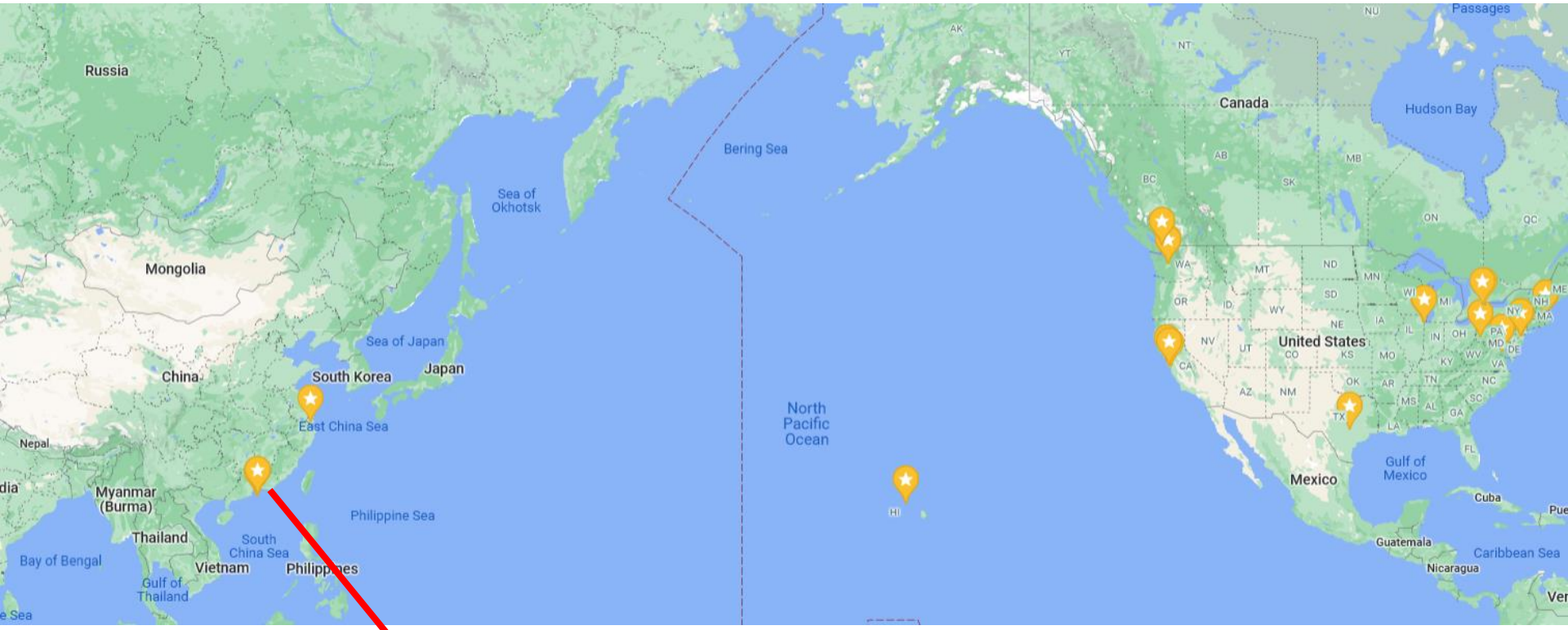
A Bit about Me



Undergraduate (2009~2013): Shanghai Jiao Tong University
ML, Graphical Models, and Recommender Systems

IJCAI'13a, IJCAI'13b

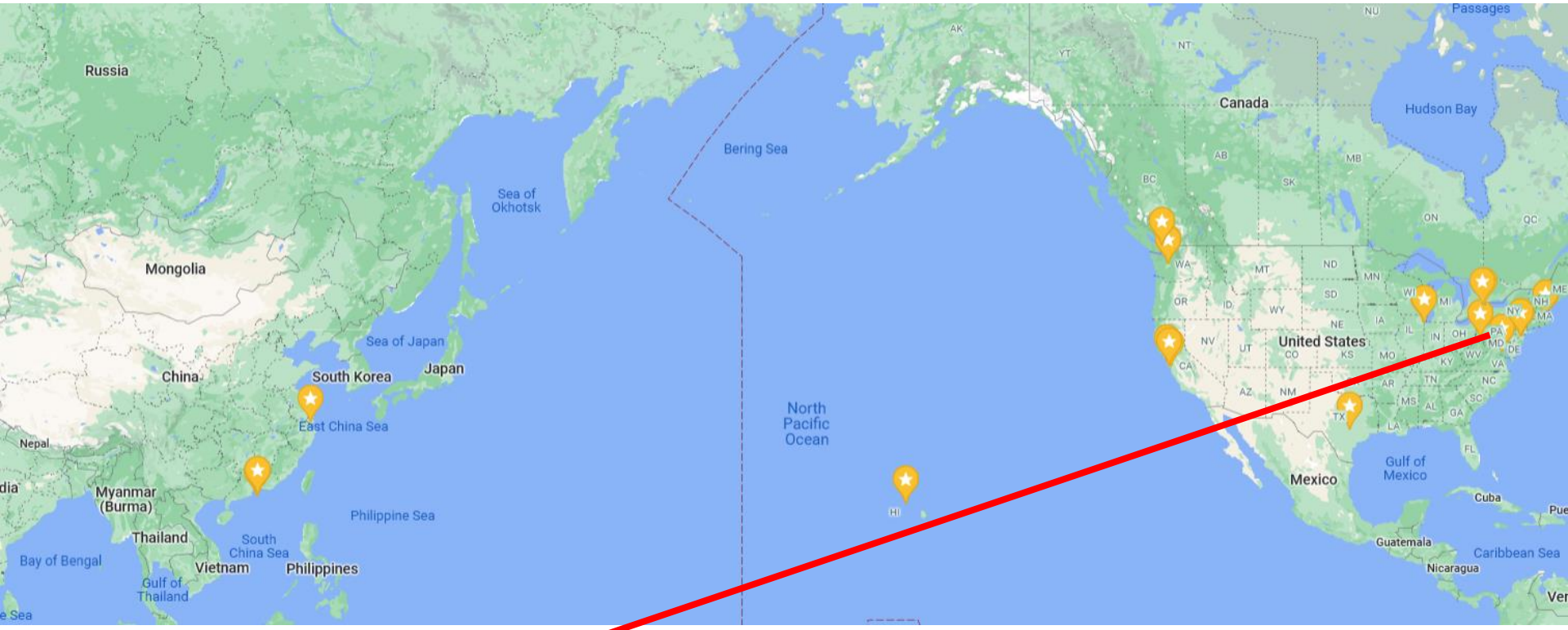
A Bit about Me



PhD (2013 Fall~2016 Fall): Hong Kong University of Science and Technology
ML, Graphical Models, Bayesian DL, and Recommender Systems

NIPS'15, NIPS'16a, NIPS'16b, AAAI'15

A Bit about Me

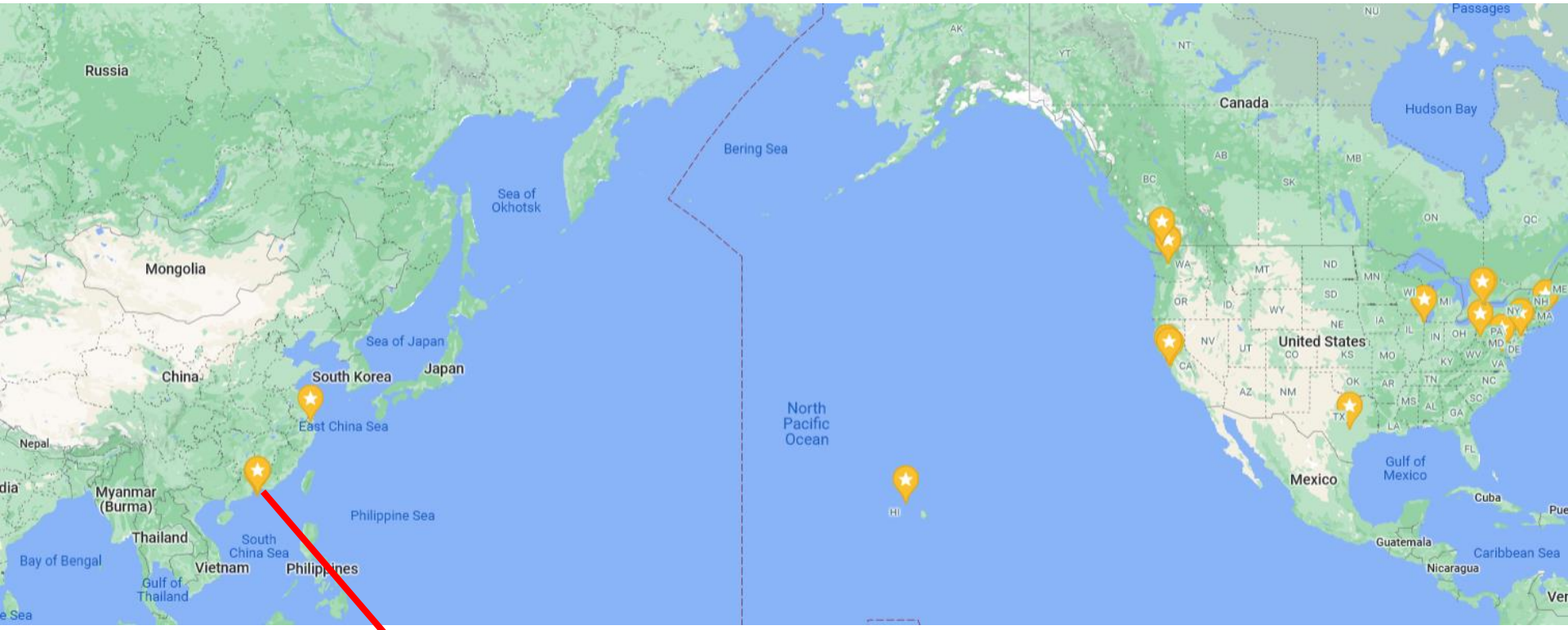


Carnegie Mellon University

Visiting Scholar (2016 Fall~2017 Spring): Visiting Carnegie Mellon University
ML, Graphical Models, Bayesian DL, and Computer Vision

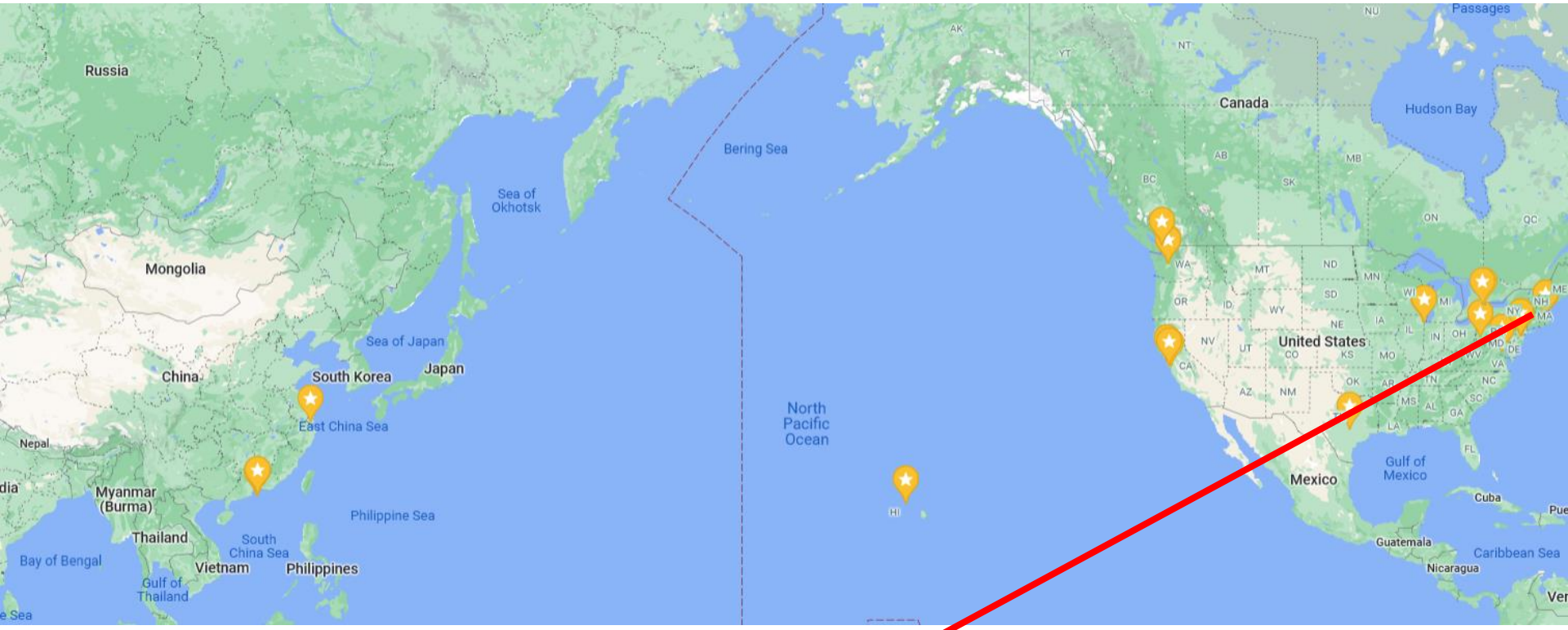
NIPS'17, AAAI'17

A Bit about Me



PhD (2017 Summer): Hong Kong University of Science and Technology
ML, Graphical Models, Bayesian DL, and Computer Vision

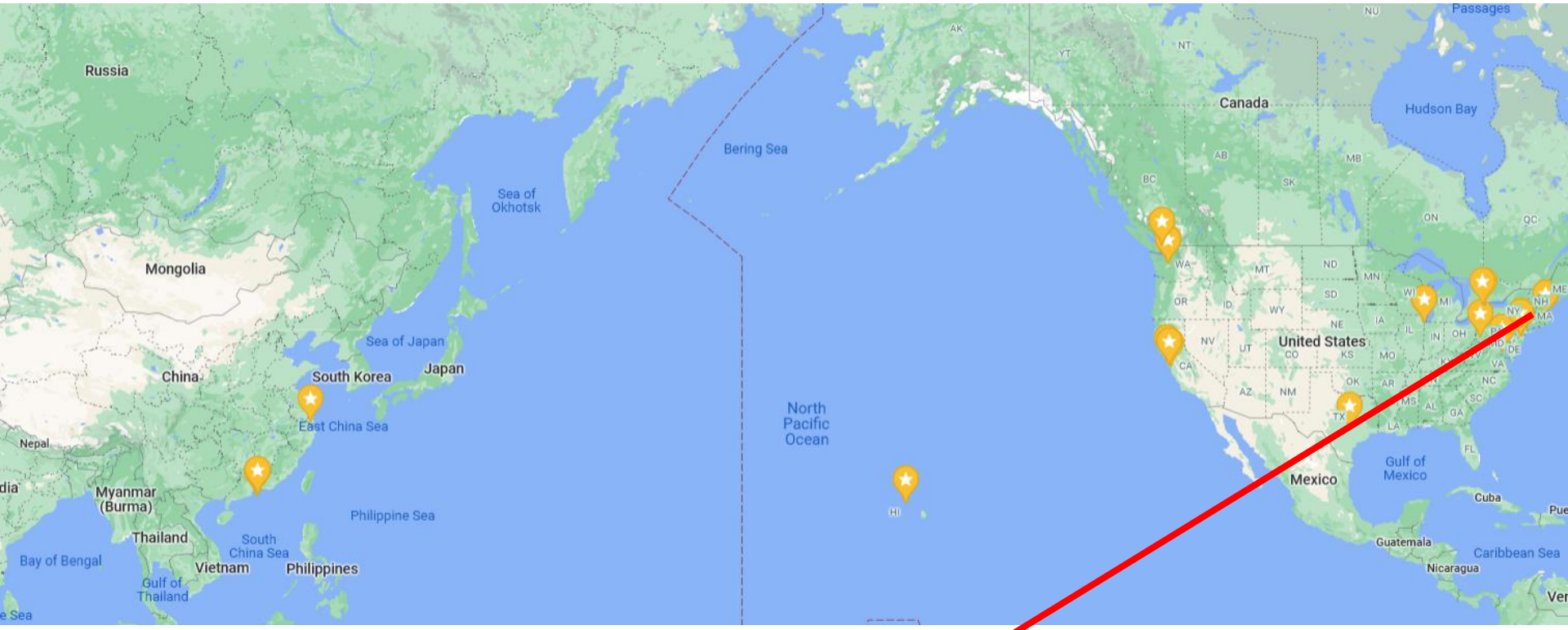
A Bit about Me



Postdoc (2017 Fall~2020): MIT CSAIL
ML, Graphical Models, Bayesian DL, and Healthcare

Nature Medicine'21, ICML'21a, ICML'20a, ICLR'19, AAAI'19

A Bit about Me



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Assistant Professor (2020 Fall~): Rutgers CS
ML, Graphical Models, Bayesian DL, Healthcare, CV, NLP, etc.

ICML'21b, ICML'21c, CVPR'21, ICCV'21a, ICCV'21b

Course Format

- A mixture of lectures and paper presentations
- There will be office hours via **Zoom** (check the course website for details)
- Post questions on the discussion forum on **Canvas**

Course Logistics

- **Course website**
  - http://wanghao.in/teaching/cs672-fall2021.htm
- **Textbook: Not required. But if you want to familiarize yourself with some ML/DL basics, some useful books are:**
  - Pattern Recognition and Machine Learning (PRML), Christopher C. Bishop, Springer, 2006, ISBN: 9780387310732
  - Deep Learning (DL), Goodfellow, Ian and Bengio, Yoshua and Courville, Aaron, MIT Press, 2016, ISBN: 9780262035613

Communication

- **Canvas Q&A:**
  - Students are encouraged to post questions and actively participate in discussions on Canvas QA portal.
    - Use Canvas for all technical questions and public communication with the course staff
- **For private questions email to me**
  - hogue.wang@rutgers.edu
- **We will post course announcements on course website and Canvas (make sure you check it regularly)**

Workload for the Course

- **40%: One paper presentation for each student.**
  - Each student will be expected to present **at least one paper** in depth (presentation length 60-70 minutes). Currently we have around 20 students registered; therefore each student may only have the chance present exactly once.
  - Students can form a team of at most two. For example, if **Alice and Bob** form a team, their team will need to present **two** papers, each with a 60-min presentation.

- **60%: One final project for each team.**
  - Students can form **a team of at most two**.
  - There will be a **mini research conference** at the end of the semester.
  - Students **present** their final projects and **answer** questions.

Tips for Presentations

- Tips: Here are some tips that can make the 60-min presentations smoother and more effective:
- (1) Look for **demo** videos on the Internet. Showing the demo as part of the presentation can tremendously help others understand the paper.
- (2) Look for **talks/slides** on the paper available **online** (from YouTube or the authors' websites). You can re-use some of the content if you feel it is helpful.
- (3) **Pause** for **questions**. At some points of your presentation, you could pause and ask if there are any questions. This could also lead to a back-and-forth discussion during the 60-70 minutes.
- (4) Look for **implementation (code)** online and run them as **live demo** during the 60-min presentation.

Timeline for Presentations

- **Three days** before the presentation:
  - Send me a copy of the slides
- **During** the presentation:
  - Answer questions from fellow students and think about how to improve the presentation
- **After** the presentation:
  - Send me a final copy of the slides

The 40% Grades for Presentations

- **Presentation**
  - https://docs.google.com/spreadsheets/d/1FoVJPxPd-tUubaOhrttmLi40D3s10Bn-v9Y2h8QH9AI/edit#gid=0
- **Answering Questions from the Audience**
- **Asking Questions during Others' Presentation**

Think of it as a group-meeting paper presentation.

The 60% Grades for Final Projects

- **Project Report**
  - Will upload some potential project ideas on Canvas later
  - You are also highly encouraged to propose your own project
- **Project Presentation**

- **Question Answering during the Project Presentation**

Think of it as a conference presentation for your published paper.

As a Presenter, What to Present

- **Task and Problem Setting**
  - What is the task? Input? Output?
  - Novelty of the task. Is it a new task?
- **Method / Model / Theory**
  - Overall method
  - Key challenges / ideas
- **Results**
  - Experiment setup
  - Evaluation metrics
  - Baseline methods
  - Quantitative / qualitative results

What Questions to Ask: Pretend to be a Student/User

- **Task and Problem Setting**
  - Can we apply the same method to other applications?
  - Are there new settings that are useful?
- **Method / Model / Theory**
  - Are there other methods for the same task?
  - Is there improvement you can make for the method?
  - Interesting tricks that are good to know?
- **Results**
  - Surprising results that are not the main claim of the paper
  - Simple baselines that work very well (may use them for my problem)
  - Negative results: methods that should have worked but did not

What Questions to Ask: Pretend to be a Reviewer/Critic

- **Task and Problem Setting**
  - Valid problem? Useful task? Realistic task?
  - Or is it a problem that does not exist?
- **Method / Model / Theory**
  - Are there design choices that do not make sense?
  - Limitations? What problems cannot be addressed by the method?
  - Is the method novel/incremental?
- **Results**
  - Missing baselines or ablation studies?
  - Are the metrics reasonable? Other metrics should have been used?
  - Unfair comparison between proposed methods and baselines?

Mask Requirement and When to Move to Remote Learning

- **Try to Maintain Social Distancing**
  - within six feet
- **From the University: "Masks must be worn during class meetings; any student not wearing a mask will be asked to leave. "**
  - to ensure health and safety of our students
- **May Move to Remote Learning for a Short Period**
  - if someone in class is tested positive and we need to be quarantined
  - announcement will be made through Canvas