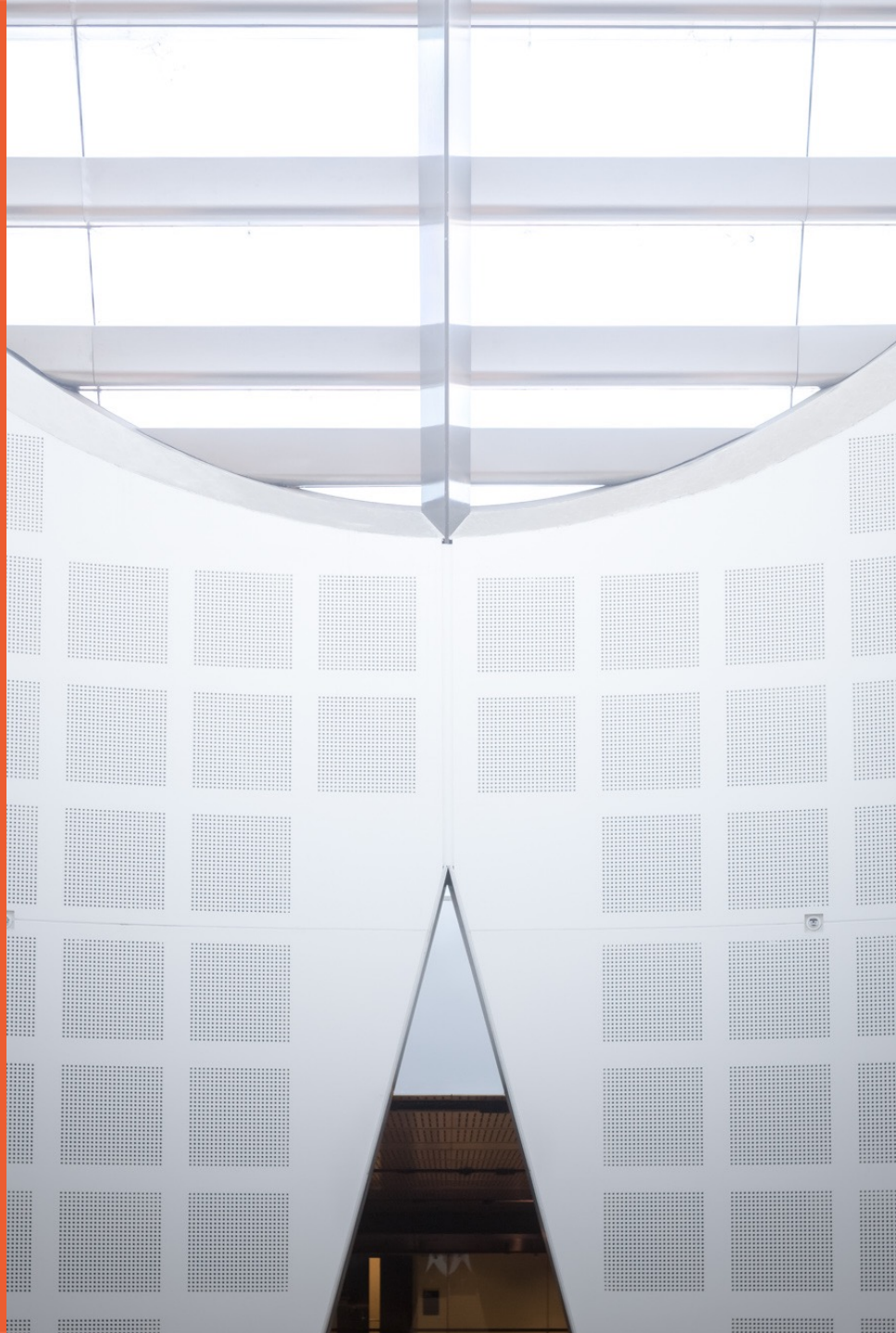
HTIN5005 Applied Healthcare Data Science

Dr Chang Xu

School of Computer Science

THE UNIVERSITY OF SYDNEY



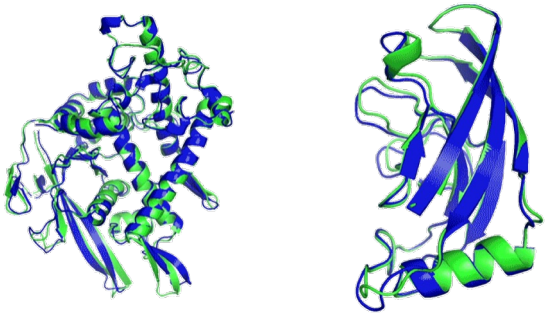
HTIN5005 Applied Healthcare Data Science

This unit will introduce you machine learning tools in healthcare data science.

- How to think about applied healthcare problems from a machine learning perspective;

- How to understand your healthcare data and make the most out of them;

- How to configure the best machine learning solutions for your healthcare problems.



'The entire protein universe': AI predicts shape of nearly every known protein. DeepMind's AlphaFold tool has determined the structures of around 200 million proteins.

Train you to be a healthcare data scientist who knows machine learning the best!

Course Content

Week 1 Introduction

Week 2 The Machine Learning Landscape

Week 3 Visual Analytics in Healthcare

Week 4 Clinical Prediction Models

Week 5 Genomic Data Analysis

Week 6 Biomedical Signal Processing

Week 7 Biomedical Image Analysis

Week 8 Drug Discovery

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Week 9 Temporal Data Mining for Healthcare Data

Week 10 Natural Language Processing for Clinical Text

Week 11 Social Media Analytics for Healthcare

Week 12 Data Privacy in Healthcare

Week 13 Review

https://canvas.sydney.edu.au/courses/53001/pages/course-contents

Week	Lecture	Tutorial	Comments
1	Introduction W1.1 - Introduction.pdf Invited Talk - Jionghui Lin and Ka Wing Cheng Invited Talk - Shuyi Jiang	Math Basics: Tutor: Linwei Tao Programing Basics: Tutor: Yanxiang Ma	W1 - Reading material.pdf
2	The Machine Learning Landscape	Tutor: Linwei Tao * scikit-learn is a popular Python library for machine learning.	Assignment 1 release: Thursday, 10 August **Reading material:** W2 - Reading material.pdf
3	Visual Analytics in Healthcare	Tutor: Linwei Tao Tutorial Slides and Jupyter Notebook	**Reading material:** W3 - Reading material.pdf
4	Clinical Prediction Models	Tutor: Linwei Tao Tutorial Slides and Jupyter Notebook	**Reading material:** W4 - Reading material.pdf

Teaching Materials and Activities

Lecture slides to introduce machine learning algorithms;

Tutorial slides to introduce the implementation (if applicable);

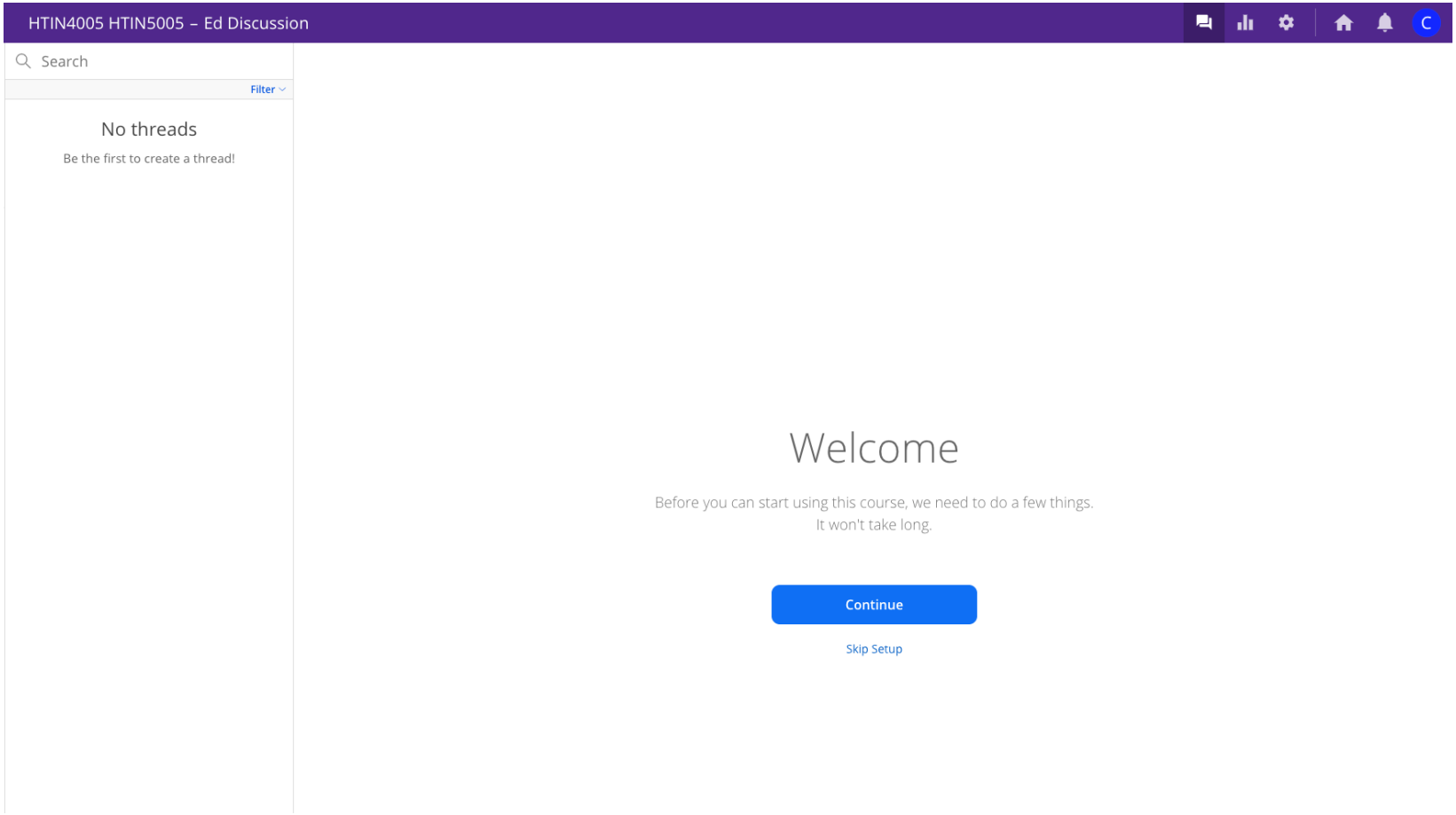
Tutorial Jupyter Notebook to introduce coding examples;

Reading materials that elaborate on the details of the introduced algorithms.

Self practice and Q&A.

HTIN5005 – Ed Discussion

https://edstem.org/au/courses/8919/discussion/



Teaching Assistant:

Mr Linwei Tao ltao0358@uni.sydney.edu.au
Mr Yanxiang Ma yama9404@uni.sydney.edu.au

Assessment Information

Assignment 1

Worth: 20% of the overall grade

Due: Thursday, 14 September (Week 7)

How to complete: Group of up to 2 students; A report to review the literature on a topic.

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Assessment Information

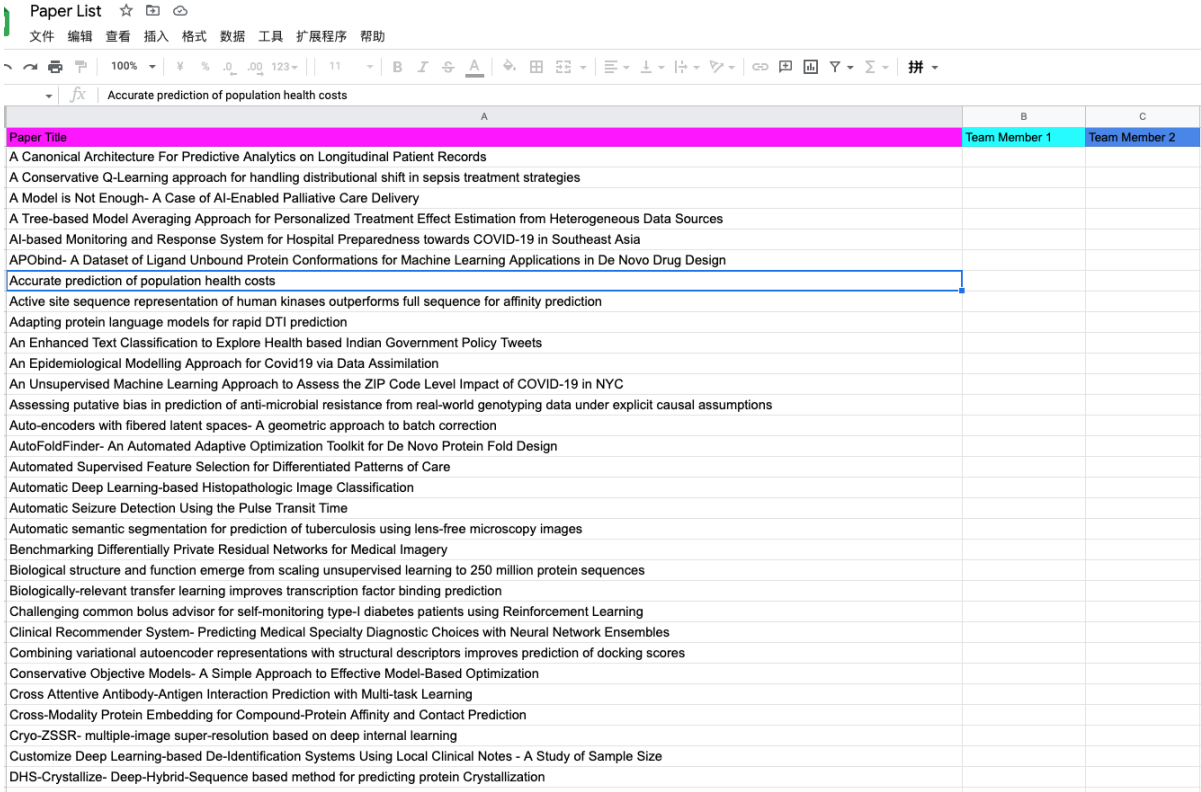
Assignment 1

Worth: 20% of the overall grade

Due: Thursday, 15 September (Week 7)

How to complete: Group of up to 2 students; A report to review the literature on a topic.

https://drive.google.com/drive/folders/1SB1RYKyX3M63gFL8g0RxixG2fEoJ5PWu



Paper Title	Team Member 1	Team Member 2
A Canonical Architecture For Predictive Analytics on Longitudinal Patient Records		
A Conservative Q-Learning approach for handling distributional shift in sepsis treatment strategies		
A Model is Not Enough- A Case of AI-Enabled Palliative Care Delivery		
A Tree-based Model Averaging Approach for Personalized Treatment Effect Estimation from Heterogeneous Data Sources		
AI-based Monitoring and Response System for Hospital Preparedness towards COVID-19 in Southeast Asia		
APObind- A Dataset of Ligand Unbound Protein Conformations for Machine Learning Applications in De Novo Drug Design		
Accurate prediction of population health costs		
Active site sequence representation of human kinases outperforms full sequence for affinity prediction		
Adapting protein language models for rapid DTI prediction		
An Enhanced Text Classification to Explore Health based Indian Government Policy Tweets		
An Epidemiological Modelling Approach for Covid19 via Data Assimilation		
An Unsupervised Machine Learning Approach to Assess the ZIP Code Level Impact of COVID-19 in NYC		
Assessing putative bias in prediction of anti-microbial resistance from real-world genotyping data under explicit causal assumptions		
Auto-encoders with fibered latent spaces- A geometric approach to batch correction		
AutoFoldFinder- An Automated Adaptive Optimization Toolkit for De Novo Protein Fold Design		
Automated Supervised Feature Selection for Differentiated Patterns of Care		
Automatic Deep Learning-based Histopathologic Image Classification		
Automatic Seizure Detection Using the Pulse Transit Time		
Automatic semantic segmentation for prediction of tuberculosis using lens-free microscopy images		
Benchmarking Differentially Private Residual Networks for Medical Imagery		
Biological structure and function emerge from scaling unsupervised learning to 250 million protein sequences		
Biologically-relevant transfer learning improves transcription factor binding prediction		
Challenging common bolus advisor for self-monitoring type-I diabetes patients using Reinforcement Learning		
Clinical Recommender System- Predicting Medical Specialty Diagnostic Choices with Neural Network Ensembles		
Combining variational autoencoder representations with structural descriptors improves prediction of docking scores		
Conservative Objective Models- A Simple Approach to Effective Model-Based Optimization		
Cross Attentive Antibody-Antigen Interaction Prediction with Multi-task Learning		
Cross-Modality Protein Embedding for Compound-Protein Affinity and Contact Prediction		
Cryo-ZSSR- multiple-image super-resolution based on deep internal learning		
Customize Deep Learning-based De-Identification Systems Using Local Clinical Notes - A Study of Sample Size		
DHS-Crystallize- Deep-Hybrid-Sequence based method for predicting protein Crystallization		

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Assignment 2

Worth: 20% of the overall grade

Due: Thursday, 26 October (Week 12)

How to complete: Group of up to 2 students; Reimplementation of an algorithm in the paper chosen by the student, and an associated report.

https://drive.google.com/drive/folders/1SB1RYKyX3M63gFL8g0RxixG2fEoJ5PWu

Paper List

文件 编辑 查看 插入 格式 数据 工具 扩展程序 帮助

Accurate prediction of population health costs

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Worth: 20% of the overall grade

Due: Thursday, 26 October (Week 12)

How to complete: Group of up to 2 students; Reimplementation of an algorithm in the paper chosen by the student, and an associated report.

Final exam

Worth: 60% of the overall grade

Examples of AI for Healthcare

Invited Talk - Jionghui Lin and Peter Cheng

Invited Talk - Shuyi Jiang