TeYang Lau

ty_lau@outlook.com | +65 82336103
linkedin.com/in/teyang-lau/ | teyang-lau.github.io | github.com/teyang-lau

WORK EXPERIENCE

Research Assistant **2018 – Present**
Sleep & Cognition Laboratory, School of Medicine, NUS
Cognitive Neuroscience Laboratory, Duke-NUS Medical School

- Mined large HPB Fitbit longitudinal dataset that led to 2 applications in understanding public health behavior and analyzing sleep variability
- Clustered >120k & analysed >300k days of Fitbit data from 1.8k+ individuals to identify 4 subgroups of Singapore working adults differentially susceptible to unhealthy behaviours during COVID-19
- Applied clustering approaches over existing cosinor methods for studying rest-activity rhythms, improving model fit by Corr: 26%, RMSE: 12%
- Co-led 2 nap research projects, one of which was published and selected as an Editor's Choice manuscript
- Investigated the effects of napping, which improves memory encoding by 20% and benefits brain functioning
- Collaborated with external government and industry partners (HPB, Oura) to explore best approach in mining datasets and structuring new projects
- Manage lab IT server and hardware

Research Intern **2016 (6 Months)**
Cognitive Neuroscience Laboratory, Duke-NUS Medical School

- Automated the visualization & computation of sleep poly-somnography that expedited the sleep report generation process by 50%
- Automated actigraphy scoring and extraction that led to reduced total process time by 30%

Research Assistant (Part-Time) **2015 (4 Months)**
Education & Cognitive Development Lab, National Institute of Education

- Administered psychological test batteries to assess children's cognitive and motor abilities

SKILLS

- **Languages & Software:** R, Python, Matlab, Tableau, SPSS
- **Technical Skills: Regression** (Linear, Multiple-Linear, Regularization), **Classification** (Logistic, K-NN, SVM, Decision Tree, Random Forest, Ensemble Learning), **Clustering** (K-Means, Hierarchical), **Neural Networks** (Deep Learning, ConvNets), **Libraries** (Scikit-learn, Keras, PyTorch), **Statistical Analysis** (T-Test, ANOVA, Regression, Non-Parametric, Linear Mixed Models), **Data** (Cleaning, Wrangling, Visualization—ggplot2, matplotlib, seaborn, plotly)

EDUCATION

BA Psychology (Honours) **2017**
Flinders University | 1st Class Honours

BA Psychology & Management **2014-2016**
Murdoch University | GPA: 3.75

- University Medal (Top 7 Graduates), Vice Chancellor's Commendation for Academic Excellence, Psychology High Achievement Award

Certificates

- **Deep Learning Specialization** (Neural Networks, Optimization, Structuring ML Projects, ConvNets, Sequence Models)
- **AI for Medicine** (Diagnosis, Prognosis, Treatment)
- **Data Science** (Visualization, Probability)

PROJECTS

Healthcare Analytics

- Multi-country effects of pandemic lockdown stringency on sleep, physical activity and resting heart rate (with Oura)
- Public sleep intervention study to improve population sleep habits (hiSG study with HPB)
- Time analyses of large-scale Fitbit data to engineer sleep features (variability metrics)
- Effects of napping duration on short- and long-term cognitive performance
- Variation of inactivity and activity rhythm according to chronotype and sleep quality
- **Heart Disease Prediction**
  - Predicted heart disease using different ML models (e.g., SVM, random forests) with best accuracy of 87%
  - Identified most important features/contributors using SHAP values

Computer Vision

- **Melanoma Detection**
  - Identified melanoma from skin lesion images using ensemble of EffNets and meta-data with AUROC of 93%
  - Explored different strategies for improving model performance (learning rate scheduling, label smoothing, test time augmentation)
- **Pneumonia Detection**
  - Detected pneumonia from chest x-rays using ConvNet (ResNet50) via transfer learning with F1-score of 92%
  - Used PyTorch as a framework for building the model on Kaggle's GPU
  - Experimented with gradient clipping and weight decay
- **Dog Breeds Classification**
  - Classified 120 dog breeds using ConvNet and transfer learning with accuracy of 88%

Natural Language Processing

- **Disaster Tweets Classification – NLP (ongoing)**
  - Classify real disaster tweets using different sequence models like LSTM, Bi-directional LSTM with attention, and transformers (BERT) with best accuracy of 84%
  - Perform text pre-processing to ensure suitable input into model

Business and Consumer Analytics

- **Drivers of HDB Resale Price**
  - Analyzed 800k resale transactions to identify the main drivers of resale price using linear regression and random forest with > 0.9 R2
  - Performed web-scraping using APIs to engineer new features that captured distance and number of amenities around each HDB flat
  - Predicted HDB resale prices with MAE of $20k
- **Chips Sales Customer Segmentation**
  - Explored customer transaction data to find insights on purchase behavior and identify groups to target for advertisements and promotions
  - Performed market basket and affinity analysis to identify customer segments that have affinity towards certain brands and product features

PUBLICATIONS

- Impact of COVID-19 lockdown stringency on sleep and resting heart rate measures across 20 countries: Longitudinal analysis from a wearable device (manuscript submitted)
- COVID-19 related mobility reduction: heterogenous effects on sleep and physical activity rhythms. *SLEEP,* 2020.
- A daytime nap restores hippocampal function and improves declarative learning. *SLEEP,* 2020. Editor's choice.
- Cognitive effects of split and continuous sleep schedules in adolescents differ according to total sleep opportunity. *SLEEP,* 2020.
- Evaluation of a portable light device for phase advancing the circadian rhythm in the home environment. *Sleep Biol Rhythms,* 2018.

TeYang Lau *Researcher*

+65 8233 6103 | ty_lau@outlook.com

teyang-lau.github.io | Github.com/teyang-lau | Linkedin.com/in/teyang-lau/ | Kaggle.com/teyang

WORK EXPERIENCE

Research Assistant | 2018 – Present

Sleep & Cognition Lab, School of Medicine, NUS
Cognitive Neuroscience Lab, Duke-NUS Medical School

- Mined large HPB Fitbit longitudinal dataset that led to 2 applications
- Clustered >120k & analysed >300k days of Fitbit data from 1.8k+ individuals to identify 4 subgroups of Singapore working adults differentially susceptible to unhealthy behaviours during COVID-19
- Applied clustering approaches over existing cosinor methods for studying rest-activity rhythms, improving model fit by Corr: 26%, RMSE: 12%
- Investigated the effects of napping, which improves memory encoding by 20% and benefits brain functioning
- Work with external government and industry partners (HPB, Oura) to explore best approach to mining datasets & structuring new projects
- Co-led 2 research studies investigating the effects of napping
- Manage lab IT server and hardware

Research Intern | 2016 (6 months)

Cognitive Neuroscience Lab, Duke-NUS Medical School

- Automated the visualization & computation of sleep poly-somnography that expedited the sleep report generation process
- Automated actigraphy scoring and extraction that led to a more productive and efficient workflow

PROJECTS

Melanoma Detection | Github, Kaggle

- Identified melanoma from skin lesion images using ensemble of EffNets and meta-data on a Kaggle TPU with an AUROC of 93%
- Explored different strategies for improving model performance (learning rate scheduling, label smoothing, test time augmentation)

Pneumonia Detection | Github, Kaggle

- Detected pneumonia from chest x-rays using ConvNet (ResNet50) via transfer learning with F1-score of 92%
- Used PyTorch as a framework for building the model on Kaggle's GPU
- Experimented with gradient clipping and weight decay

Heart Disease Prediction | Github

- Predicted heart disease using 8 different ML models (log reg, random forest, SVM, gradient boosting, etc) with best accuracy of 87%
- Identified most important features/contributors using SHAP values

Disaster Tweets Classification - NLP (ongoing) | Github

- Classify real disaster tweets using LSTM and BERT with accuracy of 84%
- Perform text pre-processing to ensure suitable input into model

Drivers of HDB Resale Price | Github

- Analyzed 800k resale transactions to identify the main drivers of resale price using linear regression and random forest with > 0.9 R^2
- Perform web-scraping using APIs to engineer new features that capture distance and number of amenities around each HDB flat
- Predicted HDB resale prices with MAE of $20k

Chips Sales Customer Segmentation | Github, Kaggle

- Explored customer transaction data to find insights on purchase behavior
- Performed market basket and affinity analysis to identify customer segments that have affinity towards certain brands and product features

Skills

Languages & Software

R, Python, Matlab, Tableau, SPSS, MS Office

Technical Skills

Regression (Linear, Multiple-Linear, Regularization), **Classification** (Logistic, K-NN, SVM, Decision Tree, Random Forest, Ensemble Learning), **Clustering** (K-Means, Hierarchical), **Neural Networks** (Deep Learning, ConvNets), **Libraries** (Scikit-learn, Keras, PyTorch), **Statistical Analysis** (T-Test, ANOVA, Regression, Non-Parametric, Linear Mixed Models)
Data (Cleaning, Wrangling, Visualization — ggplot2, matplotlib, seaborn, plotly)

Interests

NLP, Time Series, Geospatial analyses, Health Analytics, Digital Health, Cloud Computing

EDUCATION

BA Psychology (Honours)

Flinders University | 1st Class Honours

BA Psychology & Management

Murdoch University | GPA: 3.75
Awards: University Medal (Top 7 Graduates), Vice Chancellor's Commendation for Academic Excellence, Psychology High Achievement Award

Certificates

Deep Learning Specialization (Neural Networks, Optimization, Structuring ML Projects, ConvNets, Sequence Models)
AI for Medicine (Diagnosis, Prognosis, Treatment)
Data Science (Visualization, Probability)

Publications

- Objectively tracking the global sleep reboot from COVID-19 lockdowns across 20 countries (manuscript in preparation)
- COVID-19 related mobility reduction: heterogenous effects on sleep and physical activity rhythms. *SLEEP,* 2020.
- A daytime nap restores hippocampal function and improves declarative learning. *SLEEP,* 2020. Editor's choice.
- Cognitive effects of split and continuous sleep schedules in adolescents differ according to total sleep opportunity. *SLEEP,* 2020.
- Evaluation of a portable light device for phase advancing the circadian rhythm in the home environment. *Sleep Biol Rhythms,* 2018.