刘治宇

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教育背景

上海交通大学，巴黎卓越工程师学院(985、211) *2020.09 - 2024.06*

本科专业：信息工程，法语

- **核心绩点：**信息工程(90/100)，法语(87/100)，年级排名 26/98
- **荣誉奖项：**2021年校级本科生C等优秀奖学金（前30%），2022年校级本科生B等优秀奖学金（前15%），2022年三好学生（共四名）
- **数理课程：**高等数学I(92)，数列与级数(91)，线性代数与双重线性代数(94)，高等线性代数（94），拓扑与微分学（93），工程物理与化学基础1(91)，工程物理与化学基础2(94)，量子力学导论（95），电磁学基础（93）
- **编程课程：**人工智能数学基础（92），C程序与算法分析（91）
- **编程经历：**Python，C语言，C++，MATLAB，SQL
- **法语课程：**法语入门(96)，初级综合法语1(90)，初级法语语法1(94)，初级综合法语2（89），初级法语语法2（92），中级法语语法（89）
- **英语水平：**大学英语四级601分，六级540分，GRE 337分(Quant 170，Verbal 167，全球前3%)

南昌外国语学校，高中 *2017.09 - 2020.06*

- **学业成绩：**年级排名第3(年级共约600人)，获得直推名额免笔试保送进入上海交大
- **班级职位：**学习委员，数学课代表
- **荣誉：**三好学生，校级辩论赛冠军

学术实践

MIT教授(Mark Vogelsberger)线上科研项目 - 基于LSTM等序列模型、GAN等生成模型的深度学习算法综合研究与应用 (获推荐信) *2023.01 - 2023.03*

- 选题：基于CNN和Transformer的人群计数
- 研究方法：首先通过MCNN(多层卷积神经网络)提取多尺度特征，然后传入VIT建立全局感受野，最后通过一个或多个全连接层预测人群计数
- 对比实验：使用MSE作为损失函数，在ShanghaiTech数据集上进行预训练，最后在ShanghaiTech和UCF_CC_50两个数据集上与原MCNN模型进行比较
- 研究结果：对于ShanghaiTechA，MAE=102.5，MSE=156.3。对于ShanghaiTechB，MAE=21.2 MSE=32.5。在UCF_CC_50上，MAE=102.5，MSE=156.3。我们的模型在各数据集上都取得了更好的效果。该项目论文已被EI会议CEIP 2023收录

英国帝国理工大学 - 数据科学暑期学校(最佳计算机视觉项目奖) *2022.07 - 2022.08*

- 课题：医学图像分割，标记并分割出脑瘤的位置
- 数据集：使用项目提供的3000+患有脑瘤的大脑核磁共振图MRI数据，再通过数据增强，数倍提高了数据量
- 研究方法：使用CNN卷积神经网络，成功搭建Unet++网络架构，并使用BCE-Dice作为损失函数，优化了最终效果
- 对比实验：为了选取损失函数，比较了Lovasz Hinge和BCE-Dice的标记准确率，最终选用效果更加突出、收敛更快的BCE-Dice
- 研究结果：损失率(Loss)为0.181，交并比(IOU)为0.848，在所有项目组中排名第2

新加坡国立大学计算机学院 - 暑期项目(大数据分析与可视化，一等奖) *2022.05 - 2022.07*

- 课题：北京房价影响因素以及房价增长率的预测
- 数据集：成功搜集并清洗北京房屋交易数据超过30万条，包括价格各项房屋属性(面积/楼层/户型/位置/建筑材料等)
- 研究方法：学习并使用了Tableau来制作可视化图表，探究房屋属性与房价的关系，从中成功筛选出了对房价影响较大的属性
- 研究结果：利用机器学习预测每栋房屋在成交后第二年的价格，成功计算房价增长率，并且比较了不同属性对增长率的影响，为房产投资者提供建议

美国大学生数学建模竞赛(MCM) C题 量化交易策略 *2022.02*

- 模型要求：初始资金1000美元，用于投资黄金与比特币（收取交易佣金）。通过使用历史价格时间序列预测未来价格趋势，设计最优交易策略
- 研究方法：对于预测价格，首先对数据进行分解、重构、平滑化、剔除噪声等操作，然后使用LSTM时间序列模型进行预测
- 对于制定策略，考虑到该问题是一个动态规划问题，使用了MATLAB的fmincon函数进行求解，然后再使用回测工具评价不同量化策略，调整模型参数
- 最后，进行敏感性分析，调整参数重复实验，成功得到了初始资金和佣金率对最终投资收益的影响

上海交通大学第41期PRP项目：基于自然语言处理的工程法语高频重点分析 *2021.12 - 2022.09*

- 研究摘要：对上海交通大学巴黎卓越工程师学院（简称“巴院”）的法语版数学和物理教材进行梳理分析，包括词频、时态和语态统计
- 研究过程：基于NLP领域，使用Python作为编程语言，采用NLTK、spaCy等库作为主要分析工具，成功提取了各种词汇与语法点在教材中的出现频率
- 研究结果：参考词汇和语法点的出现频率，同时结合自身难度以及教学体验等NLP领域外因素，对巴院现行的法语教学给出了非常具有价值的调整建议

校园活动 & 社会实践

上海交大巴黎卓越工程师学院科创中心，“未来实验小能手”项目负责人 *2020.11至今*

- 负责策划与组织，前往附近小学开展科创教育活动，激发小学生动手能力和科创素养
- 设计趣味实验，准备相关材料，例如吹风机吹乒乓球的气压实验，以及盐水浮鸡蛋的浮力实验
- 宣传部门活动，招募了数十名志愿者，撰写相关文案并进行公众号推送

巴黎卓越工程师学院乐团，团长兼小提琴手(团员共10余人) *2020.11至今*

- 带领各乐器声部(大提琴，长笛，钢琴，架子鼓，萨克斯)进行表演排练和彩排

吴泾实验小学，法国文化宣传志愿活动 *2021.04*

- 制作20+页PPT演讲材料，准备了丰富的课堂小活动和奖励。为上百名小学生讲解法国文化、交通、饮食、建筑等知识

其他

语言： 中文(母语)，英语(高级)，法语（中级） **爱好：** 小提琴(业余九级)，编曲，篮球

计算机： 精通MS Office,Python，熟练 MATLAB，C语言，C++，SQL 以及 Tableau可视化工具

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Education

Shanghai Jiao Tong University (SJTU). Ranking Top 3 in China. 985 & 211 *2020.09 - 2024.06*

SJTU ParisTech Elite Institute of Technology

Double Major - Information Engineering & French Language

- **Core GPA:** Information Engineering (90/100). French Language (90/100). Grade rank 26/98
- **Award:** First-year university student C scholarship of excellence (top 30%), Second-year university student B scholarship of excellence (top 15%), Merit Student in sophomore year (4 places in total)
- **Maths or science-related courses:** Advanced Mathematics I(92), Sequence and Series (91), Linear Algebra and Dual Linear Algebra (94), Advanced Linear Algebra (94), Topology and Differential Calculus (93), Fundamentals of Engineering Physics and Chemistry 1(91), Fundamentals of Engineering Physics and Chemistry 2(94), Introduction to Quantum Mechanics (95), Fundamentals of Electromagnetism (93)
- **Programming courses:** Mathematical Foundation of Artificial Intelligence (92), C Program and Algorithm Analysis (91)
- **Programming:** Intermediate in Python, C & C++, MATLAB, SQL
- **French courses:** Introductory French (96), Elementary Comprehensive French I & II (90 & 89), Elementary French Grammar I & II (94 & 92), Intermediate French Grammar (89)
- **English level:** China CET-4 score 601. CET-6 score 540. GRE score 337 (Quant 170, Verbal 167, global top 3%)

Nanchang Foreign Languages School, High School *2017.09 - 2020.06*

- **Academic record:** top 3 among c.600 students (top 0.5%). Received early admission to the university
- **Class roles:** Representative of Academic Study, Class Representative of Maths
- **Award:** Merit Student**,** Championship team in the school debating competition

Academic Projects

MIT Professor (Mark Vogelsberger) Remote Research Project - Received Recommendation Letter *2023. 01 – 2023. 03*

- Topic: Crowd Counts based on CNN and Transformer / Comprehensive Research and Application of Deep Learning Algorithms based on LSTM and GAN Generation Models
- Project Format: 7 weeks of group research, 5 weeks of thesis supervision, a total of 125 class hours
- Research Methods: Firstly, multi-scale features were extracted by MCNN(multi-layer convolutional neural network), then global receptor field was established by introducing VIT, and finally, population count was predicted by one or more fully connected layers
- Comparison Test: MSE was used as a loss function to conduct pre-training on ShanghaiTech data sets, and finally compared with the original MCNN model on ShanghaiTech and UCF_CC_50 data sets
- Result: For ShanghaiTechA, MAE=102.5, MSE=156.3. For ShanghaiTechB, MAE=21.2 MSE=32.5. In the UCF_CC_50, MAE=102.5, MSE=156.3. Our model achieves better results on all data sets. The paper has been accepted by EI conference CEIP 2023 (Computer Engineering and Information Processing)

Imperial College - Data Science Online Summer School - The Best Computer Vision Project Award *2022.07 - 2022.08*

- Topic: Medical Image Segmentation. The goal was to label and segment the location of brain tumors
- Dataset: The dataset contains MRI data of 3000+ brains with brain tumors, which includes two parts: image and mask
- Research Method: Through CNN convolutional neural network, we used Unet++ as the network architecture and BCE-Dice as the loss function to carry out deep learning
- Comparison Test: In the selection of loss function, we tried Lovasz Hinge and BCE-DICE and compared their labeling accuracy, and finally chose BCE-DICE with a more prominent result
- Result: The Loss rate and the Intersection over Union ratio of the final model were 0.181 and 0.848, respectively

National University of Singapore (NUS) School of Computing (SOC) Summer Workshop - The First Prize *2022.05 - 2022.07*

- Topic: The influencing factors of Beijing housing price and the forecast of housing price growth rate
- Dataset: Collected and cleaned more than 300,000 pieces of housing transaction data in Beijing, including various housing properties (area/floor/housing type/location/building materials, etc.)
- Research Method: Used Tableau to make visualizations. Explored the relationship between house attributes and house prices and finally selected the attributes that have a greater impact on prices
- Result: Forecasted house price growth with Machine Learning methodology. Compared the influence of various attributes. Made recommendations to real estate investors

The Mathematical Contest in Modeling (MCM) Project - Problem C - Trading Strategies *2022.02*

- Model Requirement: Start with $1,000, trade in the gold and Bitcoin markets, and receive a commission on each transaction. Using only the daily price flow so far, predict the future price direction and devise the optimal trading strategy over a period of five years
- Method: Led the coding workstream in the team. Decomposed, reconstructed, smoothed and removed noise of the data, and then used the LSTM time series model to predict prices
- Considered strategy formulation as a dynamic programming problem. Used the Fmincon function of MATLAB to solve it. Conducted backtesting to evaluate different trading strategies and adjust model parameters. Created sensitivity analysis to study the impact of initial capital and commission rate on the final results

PRP Project of Shanghai Jiao Tong University, No. 41: High frequency grammar points analysis in engineering French based on Natural Language Processing *2021.12 - 2022.09*

- Abstract: Analyzed the French version of mathematics and physics textbooks compiled by college. Optimized French language teaching to make it closely related to engineering courses
- Research Process: In the field of NLP, used Python as the main programming language, NLTK, spaCy and other libraries as the main analysis tools, and finally obtained the frequency of various vocabulary and grammar points in the textbook
- Result: With reference to the frequency of vocabulary and grammar points, we gave valuable suggestions on the current French language teaching method in my college

Leadership & Activities

The Head of Project at Science and Innovation Center in ParisTech Elite Institute of Technology *2020.11 - Present*

- Responsible for planning and organizing scientific innovation education activities in nearby primary schools to stimulate primary school students' hands-on ability and scientific innovation literacy
- Design interesting experiments and prepare relevant materials, such as air pressure experiment of table tennis blown by hair dryer and buoyancy experiment of egg floating in salt water
- Publicize the activities of the department, recruited dozens of volunteers to write relevant documents and push them to the public account

College Orchestra Team Leader & Violin Performer (c.15 members) *2020.11 - Present*

- Coordinated performers of various musical instruments including cello, flute, piano, drums and sax. Arranged group practices and rehearsals
- Accomplished performance shows in various concerts including Viva la Vida. Attracted 100+ attendees and received unanimously positive feedback

Cultural Exchange Event Volunteer at Wu Jing Elementary School *2021.04*

- Produced 20+ pages of ppt presentation. Presented to 100+ pupils regarding French culture, transportation, food and architecture

Miscellaneous

Languages: Chinese (Native), English (Intermediate), French(Intermediate)
Computer skills: Proficient in MS office, Intermediate in Python, C, C++, MATLAB and SQL
Hobbies: Violin (amateur performer), Musical arrangement, Basketball