### Spring 2023

# Undergraduate Research Symposium



The NYU Shanghai Undergraduate Research Symposium is a university-wide celebration of research which showcases work from undergraduates spanning Arts and Sciences, Business, and Computer Science, Data Science, and Engineering. The Symposium features recently completed projects by Major Honors students, as well as research papers and creative work by students for their Capstone Projects, Independent Study Courses and as part of the Dean's Undergraduate Research Fund (DURF).

Visitors will have the opportunity to cast a vote for the projects that most impress them, and a panel of NYU Shanghai faculty will select the winning projects.



FLOOR PLAN	
<b>LIBERAL ARTS &amp; BUSIN</b>	01 IESS
STEM	02-06
STER	07-13
JUDGES	14-15
AWARDS	16
	10

Undergraduate Research Symposium



- 9-9:45 am Presentations Liberal Arts & Business (E302) STEM (E303)
- 10-11 am Q&A Session

11:15-11:30 am Awards Ceremony (Magnolia House)

## LIBERAL ARTS & BUSINESS

Business Global China Studies Social Science

## Valuation of a Private Law Firm - Clifford Chance

Leonardo Ye

Area: Business Mentor: Rodrigo Zeidan

The purpose of this study is to estimate the intrinsic value of Clifford Chance, a multinational law firm based in London. I apply two different valuation methods: the DCF model and comparables analysis.

The DCF model involves estimating the future cash flow of the firm and discounting them back to their present value using a discount rate.

The comparables analysis involves identifying companies in the same industry and comparing their valuation multiples to those of Clifford Chance. I use firms' financial data to derive valuation multiples and then compare them to arrive at a valuation range.

## Why Do Young Chinese Females Perform Male Identity on a Text-Based Subcultural Video Game?

#### Fenglin Ju

Area: Global China Studies Mentor: Zhiqiu Zhou

This paper examines why young females impersonate males in the video game Celebrity Moments. Based on digital ethnography and interviews with experienced users, my findings unpack two primary motivations for digital impersonation: (1)The figures of males in cinematic productions are usually created with perfect values that intensify females' ideal intimate partner and self; (2) impersonating males provide females with more possibilities that are usually inaccessible to them, participation in writing BL fan fiction closely, and open self-expression. This paper contributes to understanding how young female users reconfigure their digital identities and negotiate with patriarchy in Chinese digital spaces.

## Transit Proximity and Property Values in New York City

Leo Shirky

Area: Social Science Mentor: Tyler Haupert

This study will fill in a gap within the existing research on the transit access-property value relationship, specifically with respect to existing, large, high-frequency, high-capacity rapid transit heavy rail systems in large American metro areas. If a residual positive effect on property values can be found, then this study will help fill in a gap in the existing literature. This study will use GIS and a large pre-existing database, and easy and understandable figures to communicate the findings of this study. This research has implications for the broader debate surrounding the role of rapid transit in urban areas, and the specific debate around Value Capture as a mechanism for transportation funding.

## The Relationship Between Political Regimes and the Promotion of Tertiary Education

**Kevin Zhao** 

Area: Social Science Mentor: Almaz Zelleke

Education is one of the keys to long-term economic development and poverty reduction. Scholars have argued the significance of government in facilitating domestic education development and outcomes. Researchers have found a positive relationship between democracy and basic human capital but did not specify what factors of democracy impacted it the most. This research looks at the association between and the causality of five factors of democracy with different education inputs and outcomes. This research seeks to answer the question: How do different factors of democracy and degree of democracy impact education inputs and outcomes?



CS/DS/Engineering Interdisciplinary Math Neural Science

## **Campus Tour Routing Optimization**

Liyuan Geng Jiasheng Ni

Area: CS/DS/Engineering

As NYU Shanghai has built its beautiful New Bund Campus, there are many visitors coming to the new campus, and having a campus tour. Since most visitors have a limited amount of time, the campus tour should be efficient. Therefore, we seek to construct a mathematical model to choose an optimal visiting route that maximizes the total weights of each part of the campus they have visited, with time limit as general constraints. Each part of the campus is represented by different weights, respectively.

## Investment Methodology Analysis of the Cryptocurrency

Lawrence Lim Weichen Liu

Area: CS/DS/Engineering Mentor: Jiding Zhang

This research project aims to identify the key factors and methods for valuing a crypto asset. Specifically, the focus is on the importance of assessing code security and market correlation. Through a combination of literature review and case study analysis, we explored state of the art code auditing for crypto assets, as well as identify potential areas for improvement. Additionally, we explore market analysis techniques used in crypto rating, contributing to our rating methodology. The ultimate goal of this research is to provide insights that can help investors make informed decisions about investing in crypto assets.

## Customer Segmentation in Retail Banking: Modeling the HSBC Dataset

Summer Xiao Shan Lu

Area: Interdisciplinary Mentor: Hongyi Wen

We use a dataset with transaction and demographic information provided by HSBC to carry out customer segmentation with a recommendation-based approach. We utilize Neural Collaborative Filtering (NCF) to create a comprehensive recommendation system based on credit card transaction data. Our model achieves a hit ratio of 0.756. Through correlation analysis and association rule mining, we test our model and explain our recommendation results with customer characteristics. Compared with previous work, our model provides a categorization specific to users' purchase preferences, which can empower the marketing team to better tailor perks and promotions to the designated customers. Unveiling the Roots of Matrices: A Generalization and Field Extension of the Square Root of Matrices

> Kehan (Genghis) Luo Rongyao (Charlie) Li

Area: Mathematics Mentor: Shengkui Ye

In this research, we explore and investigate advanced topics in linear algebra. Specifically, we first prove the Theorem: Any positive semi-definite symmetric real matrix has a unique positive semi-definite symmetric square root by polynomial matrices. Then we give a generalization from field  $\mathbb{R}$  to  $\mathbb{C}$ , and from square root to k-th root. Finally, we demonstrate the Theorem: Any invertible complex matrix has a k-th root by Jordan Canonical Form and Taylor Expansion. Our proofs' validity and theorems' value are considered and discussed. These topics have significant applications in the field of Algebra and Lie Theory.

## Brownian Motion and Stochastic Calculus in Finance

Jiale Zheng, Chijie An Yuxin Ji, Zhou Liu

Area: Mathematics Mentor: Wei Wu

This project focuses on studying the notion of Brownian Motion, stochastic calculus, and its applications in quantitative trading and other financial fields. The unpredictability of the financial markets contributes to the difficulty of building a mathematical model to describe financial trends. Compared to ordinary mathematical modeling approaches, we focus on building a model using stochastic process theories and corresponding stochastic calculus for the calculation. Among the models in the stochastic process, we find out that the Brownian motion might be the best to fit this application scenario, for it has martingale properties and Markov properties, etc., which are suitable for describing some interesting features of the phenomenon in this field.

## Low-Frequency Cortical Activity Tracking Speech in Hidden Hearing Loss

Shucheng Li

Area: Neural Science Mentor: Xing Tian

Hidden hearing loss refers to the weakened ability to perceive loud sound due to long-term exposure to a loud noise environment. But the diagnosis of hidden hearing loss is hard because the volume range of the patient is not obviously influenced, and the encoding ability of loud sound is hard to detect. In this research, we used EEG to measure the neural response during passive listening and evaluate the effects of the temporal response function trained from the data. We then found out that the TRFs of high-risk group have worse encoding performance than the lower-risk group, which supports the effect of this new diagnosis method.





#### **Marcela Godoy**

Undergraduate Coordinator of Interactive Media Arts (IMA), Assistant Arts Professor of IMA



#### **Melanie Hackney**

Assistant Dean for Curriculum; Director, World Languages; Clinical Associate Professor of French



#### **Mathieu Laurière**

Assistant Professor of Mathematics and Data Science

## JUDGES



#### **Olivier Marin**

Associate Dean of Arts and Sciences, Professor of Practice in Computer Science



#### **Christina Dan Wang**

Assistant Professor of Finance, NYU Shanghai; Global Network Assistant Professor, NYU



#### **Linmin Zhang**

Assistant Professor of Practice in Neuroscience



## **Liberal Arts & Business**

Best Research Project Best Presentation

## STEM

Best Research Project Best Presentation

## **Most Popular Project**



Vote for Your Favorite Project(s)!



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