

LONGHAO JIN

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RESEARCH INTEREST

Statistical Learning, Machine Learning, Data Analysis, Risk Management, Variable Annuity

EDUCATION

PhD, Mathematics, University of Illinois at Urbana-Champaign

Expected May 2022

- Course Highlights: Data Science, Deep Learning, Big Data, Machine Learning, Recommendation System, Data Structure, Introduction to Algorithms, Statistical Learning, Mathematical Statistic, Probability Theory, Stochastic Process, Real Analysis

Master, Actuarial Science and Risk Management, University of Illinois at Urbana-Champaign

Aug. 2016 - May 2018

BS, Mathematics and Applied Mathematics, Fudan Univeristy

Aug. 2012 - May 2016

EXPERIENCE

United States COVID-19 Cases Forecast and Analysis (Github Repository)

Apr. 2020 - June 2020

- Performed k-means, hierarchical and spectral clustering to determine different growth patterns of death cases in county level according to population, age, common diseases and medical resource data. Proved that county with high medical resource-population ratio has a lower growth rate of new death cases.
- Implemented random forest to measure the scale of the death cases, employed linear regression with Lasso penalty to predict the death cases for each county and achieved a low root mean squared error (28.95). Provided a more detailed county level death prediction compared with results from the White House.
- Evaluated the importance of the anti-contagion policy such as stay-at-home and social-distancing, specified the susceptible population and provided suggestions to public about how to reduce the risk of being infected.

Facial Expression Recognition with Keras (Github Repository)

June 2020

- Developed a facial expression recognition model in Keras, constructed a Convolutional Neural Network (CNN) with 4 convolution layers and 2 fully connected layers to predict 7 different types of facial recognition and obtained 64% model accuracy with a small log-loss (0.97).
- Created a flask app to make predictions and designed an HTML template for the flask app. The model can be used to recognize facial expressions in customized videos.

Deep Learning Mini Projects (Github Repository)

Oct. 2018 - present

- Transferred the sentence to emoji by the baseline word embedding model and extended it with Long Short-Term Memory (LSTM). The 2 layers LSTM sequence classifier achieved 92% model accuracy.
- Applied speech recognition technique and designed a simple trigger word detection model with 1 convolutional layer, 2 gated recurrent unit (GRU) and 1 dense layer. Generated speech data by data synthesis to train and test the model.
- Constructed objective detection model with You Only Look Once (YOLO) algorithm and filtered the detection box by using non-max suppression to get rid of boxes with low score and select one box from overlapped results that detect the same objective.
- Performed art generation with Neural Style Transfer by applying VGG-19 model and generated novel artistic result using user's customized images.

Managing Investment Risks of Insurance Contractual Designs

Sept. 2019 - May 2020

- Analyzed the potential investment risks for equity-linked insurance product, quantified the tail of the total revenue for the insurance company, designed buying and selling strategies for both policyholder and insurer.
- Extended the baseline Black-Scholes model to a stochastic model with volatility jump, measured the impact of the stock price fluctuation, calibrated the model parameters by the real market data.
- Constructed novel inflation-linked product to protect against the inflation, determined analytical solution of future reserve for insurer, performed efficient dynamic hedging strategy to buffer the inflation risk.

Holistic Principle for Risk Aggregation and Capital Allocation

Aug. 2018 - Sept. 2019

- Introduced a novel holistic approach in a quantitative framework which attains Pareto optimality results and combines multi-step classical framework to a one-pass algorithm to achieve efficiency and consistency.
- Determined analytical solution for different scenarios and provided practical interpretations, achieved robustness of the result by showing the dynamic convergence property.
- Extended the unconstrained case to constrained case with Karush-Kuhn-Tucker conditions, generalized the analytical result to n-business lines setting and obtained equal efficiency.

PUBLICATIONS

- Wing Fung Chong, Runhuan Feng, Longhao Jin (2019). *Holistic Principle for Risk Aggregation and Capital Allocation*. SSRN: 3544525
- Runhuan Feng, Longhao Jin (2020). *Managing Investment Risks of Insurance Contractual Designs*. Working report in-progress.

PROGRAMMING SKILLS

Software Python, Matlab, R, VBA, SQL