

<THE DISSERTATION TITLE>

By

Shuming Zhou

1611144

Supervised By

Nanlin Jin

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ABSTRACT

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DECLARATION

I hereby certify that this dissertation constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions or writings of another.

I declare that the dissertation describes original work that has not previously been presented for the award of any other degree of any institution.

Signed,

Shuming Zhou

ACKNOWLEDGEMENTS

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# Introduction

研究背景

1. 研究领域——新冠疫情
2. 发展现状
3. 研究对象

研究进展，指出存在的问题，已知-》未知

现在已经实现了a，但是还不能实现b或者说a还有局限

接着以However为标志，展开讨论

重点和亮点

概述研究工作，对思路，策略和方法的讨论，不涉及细节

交代本文和前面研究的不同

s the problem stated both in a general and in a specific way? Are the purpose and rationale of the project stated clearly? Are the advantages of the proposed work justified? Are the project aims and objectives clearly stated?

# Literature Review

Introduction of topic related research

研究原因：COVID-19对世界影响巨大，各国都收到了冲击, 对于环境，社会（<https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3644567>），经济(https://www.neaman.org.il/EN/Files/Global%20Economic%20Impact%20of%20COVID-19\_20200322163553.399.pdf)，教育(https://www.scirp.org/journal/paperinformation.aspx?paperid=103646)各个方面都有巨大影响。

不仅仅是国家，对个人而言也有着巨大的影响，不仅仅是生理的（https://www.sciencedirect.com/science/article/pii/S1936657420301461）也有心理（https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7165115/）的。因此这份研究的主题就是对于COVID-19而展开的。

对新冠疫情的类型分三大主体：对新冠疫情下的人民的研究(和上面相同)，对新冠疫情本体的研究，比如病毒本身的研究(https://www.sciencedirect.com/science/article/pii/S1567134820302537)医疗方面(https://www.sciencedirect.com/science/article/pii/S1521661620303181)以及对新冠疫情发展的预测(file:///Users/mac/Documents/GitHub/SAT405\_program/exercise/Prediction\_COVID\_19.pdf)，以及对政府的研究：政策的研究(https://www.nature.com/articles/s41562-020-0909-7)。（这三个）

对人民的研究主要是对疫情的心理和生理的评估，和本研究关系不大，而对病毒本身的研究以及医疗方面的研究涉及具体的医学和生物学知识，不在本文的探讨范围之内，其次就是对疫情的未来发展的趋势，这是对本文极其相关的点，具体也会在下文探讨。

对政府的研究主要是对NPI的研究，（https://www.sciencedirect.com/science/article/pii/S0048969721005982）NPI代表了具体的政策实施。当然也有对政策经济代价的研究，比如(https://www.medrxiv.org/content/10.1101/2020.03.26.20044552.abstract)，提到了中英两种模式下的经济代价。

再具体一些，对于这些研究，很多都是对单个因素的研究，比如单纯探讨疫情下人的心理生理状况，以及单独对npi的研究，其中也有很多是两个要素综合起来研究的，比如oxford的论文(file:///Users/mac/Documents/GitHub/SAT405\_program/405%E6%96%87%E7%AB%A0.pdf)，探讨病毒传播率以及NPI的政府政策，以及

<https://www.jmir.org/2020/9/e21419/>

这个文章主要是探讨政策和人民的态度。

当然最和本研究主题相关的，是政府政策以及病毒传染率这两个要素。对个人态度选择而言并不在本topic的论述范围之内。

通过对这两个要素的研究，我们可以获得政策和传染率之间的模拟过程，并预测将来政策的走向和疫情传染率的发展。这对于公共安全是有重大意义的，也能够为未来新的传染病提供研究方向，比如猴痘。

而对于中英两国不同的抗疫政策的研究也是具有重要意义的，各个国家之间互相借鉴抗疫的模式能够互相进步并获得对政策影响的更加深刻的认识，对全球疫情转好具有帮助

Theme2

目前对于疫情发展的趋势主要使用各种算法，对以下参数进行模拟。

首先是province/state, country/region, last update, confirmed, death and recovered cases的参数作为输入，应用support vector regression (SVR) [16] and polynomial regression (PR)的机器学习模型（file:///Users/mac/Documents/GitHub/SAT405\_program/exercise/Prediction\_COVID\_19.pdf）。

其次是Oxford的GA，对NPI，和病毒变异率以及传染率进行模拟（file:///Users/mac/Documents/GitHub/SAT405\_program/405%E6%96%87%E7%AB%A0.pdf）

以及<https://docserver.ingentaconnect.com/deliver/connect/tsp/15261492/v125n2/s17.pdf?expires=1665805258&id=0000&titleid=75011046&checksum=DF9ED9D5B75EBFC8D20205E39276A90D&host=https://www.ingentaconnect.comc>的采用启发式算法，主要应用高斯模型预测死亡率。

Theme3

但是经过上述分析发现以上的预测算法的参数是欠缺的，并未考虑政策的经济因素，根据上述提到的（file:///Users/mac/Documents/GitHub/SAT405\_program/exercise/2020.03.26.20044552v1.full.pdf）政策会导致经济代价的不同，而根据（https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#C）事实，英国调整了政策用于开放经济，这说明政策不仅仅影响传染率，也会被经济代价所影响，而中英两国的经济政策的改变也有所不同（file:///Users/mac/Documents/GitHub/SAT405\_program/exercise/2020.03.26.20044552v1.full.pdf），因此，对未来政策变化的模拟和未来感染人数的确定需要结合当前政策，具体的模式，以及经济代价。

因此这里的研究主要是采取模拟的形式，运用类似GA的模型来体现政府政策的变化以及相应的经济代价和病毒传染率如何具体影响政策的变化。根据上述的讨论，这个方向具有研究的价值。

而对于猴痘病毒的预测，目前还是集中在神经网络来学习，缺少启发式算法的研究，这个研究能够给预测猴痘病毒的人群一点参考意义。<https://www.ejgm.co.uk/download/analyses-of-polynomial-neural-networks-for-prediction-of-the-prevalence-of-monkeypox-infections-in-12400.pdf>

# Research Methodology

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# Results

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# Analysis

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# Discussion

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# Conclusions

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