Summary of a Year of Work in Covid-19 Statistical Modeling

https://www.researchgate.net/publication/349008991_Commented_Summary_of_a_Year_of_Work_in_Covid-19_Statistical_Modeling

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Outline

- Intro/Background
- Data Analysis Papers
- Modelling Papers
- Systems Analysis Paper
- Tech/Socio-Econ. Discussions
- Conclusions

Objectives

- Provide Public Health Professionals with Stats Applications in their Work
- Provide Statisticians with some Examples of Applications in Public Health
- Incentivize their Joint Work
- Incentivize Retired Community Contributions

Background

- Illustrative Covid-19 Example in the Media
  https://www.syracuse.com/coronavirus/2020/03/how-fast-can-coronavirus-spread-statistics-professor-explains-why-we-need-to-act-now-video.html
- Formal Proposal to the Retired Community
  https://web.cortland.edu/matresearch/Covid-19Proposal2020.pdf
- Previous Experiences (Zika/Ebola)
  https://web.cortland.edu/matresearch/EbolaGageR&R2016.pdf

  https://web.cortland.edu/matresearch/2017ZikaVirusFinPres.pdf
- Impact of our Work in the Web
  https://web.cortland.edu/matresearch/SELECTEDREADINGSRESEARCHGATE.pdf

Data Analysis: DOE

- *Monitoring Community Infection Levels of Covid-19 Virus using Quality ControlTechniques* https://web.cortland.edu/matresearch/AplicatSPCtoCovid19MFE2020.pdf
- *DOE in Identification of Factors impacting Community Spread of Covid* https://www.researchgate.net/publication/341532612_Example_of_a_DOE_Application_to_Coronavarius_Data_Analysis
- *FF-DOEs in Identification of medical treatments that reduce Covid19 infection* https://www.researchgate.net/publication/344924536_Design_of_Experiments_DOE_in_Covid-19_Factor_Screening_and_Assessment

Data Anal: Reliability/Logistics

- *Design and performance evaluation of Intensive Care (ICU) units, using Reliability* https://www.researchgate.net/publication/342449617_Example_of_the_Design_and_Operation_of_an_ICU_using_Reliability_Principles
- *An Example of Survival Analysis of Covid-19 using ICU & Patients Ventilator data* https://www.researchgate.net/publication/342583500_An_Example_of_Survival_Analysis_Data_Applied_to_Covid-19
- *Statistical Methods to Accelerate Covid-19 Vaccine Clinical Trials using sequential analysis* https://www.researchgate.net/publication/344193195_Some_Statistical_Methods_to_Accelerate_Covid-19_Vaccine_Testing
- *Survival Methods to Establish Covid-19 Vaccine Life (Length of its Effectiveness)* https://www.researchgate.net/publication/344495955_Survival_Analysis_Methods_Applied_to_Establishing_Covid-19_Vaccine_Life
- *ICU Staff and Equipment Requirements using the Negative Binomial Distribution* https://www.researchgate.net/publication/345914205_Covid-19_ICU_Staff_and_Equipment_Requirements_using_the_Negative_Binomial

Data Anal: Multivariate

- *Principal Components and Discriminant Analysis of Covid-19 data: Part I*

https://www.researchgate.net/publication/341385856_Multivariate_Stats_PC_Discrimination_in_the_Analysis_of_Covid-19

- *More Principal Components and Discriminant Analysis of Covid-19 data: Part II*

https://www.researchgate.net/publication/342154667_More_on_Applying_Principal_Components_Discrimination_Analysis_to_Covid-19

- *Logistic Regression/Discriminant Analysis Identifying key Covid-19 Vaccine Clinical Trial Factors*

https://www.researchgate.net/publication/346956247_Logistic_Regression_in_Factor_Identification_of_Covid-19_Vaccine_Clinical_Trials

Modelling: Markov Chains

- *A Markov Chain model to study the spread of the Covid-19 virus*

https://www.researchgate.net/publication/343021113_A_Markov_Chain_Model_for_Covid-19_Survival_Analysis

- *A Two-Absorbing-States Markov Chain to study the problem of Covid-19 Herd Immunization*

https://www.researchgate.net/publication/343345908_A_Markov_Model_to_Study_Covid-19_Herd_Immunization

- *A Markov Chain to study the problem of Re-opening Colleges under Covid*

https://www.researchgate.net/publication/343825461_A_Markov_Model_to_Study_College_Re-opening_Under_Covid-19

- *A Markov Model to Assess Covid-19 Vaccine Herd Immunization Patterns*

https://www.researchgate.net/publication/347441411_A_Markov_Model_to_Assess_Covid-19_Vacine_Herd_Inmunization_Patterns

Tech/Socio Econ. Discussion

- *Fallouts of Off-Shoring (outsourcing) and Tax payers' contributions, to Coronavirus Pandemic* https://www.researchgate.net/publication/341685776_Off-Shoring_Taxpayers_and_the_Coronavarus_Pandemic
- *A Digression on the Interaction between Race, Ethnicity, Class and Coronavirus.* https://www.researchgate.net/publication/343700072_A_Digression_About_Race_Ethnicity_Class_and_Covid-19
- *A Digression about Aspects of Clinical Trials for the new Vaccine against Covid-19.* https://www.researchgate.net/publication/346305686_A_Digression_on_Covid-19_Vaccine_Clinical_Trials_and_its_Consequences
- *A Digression on Covid-19 Vaccine Rollout.* https://www.researchgate.net/publication/348607971_A_Digression_on_Covid-19_Vaccine_Rollout

Extension: Systems Modelling

- *Quality Engineering Methodology in Covid-19 Systems Design and Improvement*
  https://www.researchgate.net/publication/352998703_Quality_Engineering_Methodology_in_Covid-19_Systems_Design_and_Improvement

- Analyses of four important Covid-19 systems:
  - *Opening of the Economy*,
  - *Locking Down of the Economy*,
  - *Re-Opening of Schools*,
  - *Vaccine Rollout*

Conclusions:

To *reach four audiences*: (1) *public health* professionals and researchers, (2) *medical doctors*, (3) *statisticians* and (4) *the public* in general.

To *encourage public health and medical professionals to* use more statistical procedures and *do more joint work with statisticians, and vice-versa.*

To encourage retired *statisticians,* who have the experience, financial support and the time to provide such assistance, *to contribute these to Covid-19.*

To place tutorials and models in the hands of the specialists, so they *can be improved* and redeveloped with better information; or used as illustrations of alternative methods to assess and improve public health plans.

Finally, these *tutorials and models can be included* as part of biostatistics, or as part of applied statistics, courses.