MDM4U Final Project – Research Questions

Sports

1. Who is the GOAT of soccer? Messi, Pele, Maradona or Cruyff?
2. Does your birth-month predict success in hockey? Soccer? Track and field?
3. How has the increased use of 3-pointers changed the NBA?
4. To what extent did Wayne Gretzky change the game of hockey?
5. What trends can we see in the winning high-jump heights in the Olympics?
6. To what extent has the use of motion capture data altered strategy in the NBA?

Finance, Business

7. What statistical irregularities allowed Madoff to be caught?
8. Why is 80% of volume on the stock market traded by AI and what results does this have?
9. How do stock brokers make their predictions and are random number generators actually more effective?
10. In what ways and with what results have food prices increased inflation?
11. How did COVID impact small businesses?
12. How do well can social justice indicators allow us to predict a country's GDP?
13. What will the impact of AI have on the world's economy?
14. How is statistical modelling used by on-line retailers to increase sales?

Education

15. To what extent are the EQAO results statistically valid?
16. What do international testing scores tell us about different educational systems?
17. To what extent are the Macleans University Rankings accurate?
18. Are test or projects more beneficial to learning?
19. What are the lingering effects of the COVID epidemic on students?
20. Does education level predict future economic success?
21. Is an ivy-league university education really better than a smaller college?
22. Do the learning styles (visual, auditory, written learner) really exist?
23. Is there an upper limit to our visual memory?
24. In what ways can social justice indicators predict standardized test results?

Language, Writing, Linguistics, Computer Science

25. How can statistics help us to understand un-broken writing systems like the Indus Valley Civilisation, Minoan Linear A, Inca Quipu, or the Teotihuacan?
26. What patterns in English make the random alphabet cipher easy to break?
27. To what extent did the Enigma machine improve on Caesar shift encryption? (To what extent does RSA encryption improve on both?)
28. In what ways and with what results will quantum computing make RSA encryption obsolete?
29. Why is Huffman encoding so effective in generating codes?
30. Since 1965, how accurate has Moore's Law been in predicting technology growth?
31. What does statistics modelling predict about the power of AI in 10 years?

32. Why did the IANA (Internet Assigned Numbers Authority) switch from IPv4 to IPv6, and why has the switch-over been so difficult?
33. How did the Unicode consortium use statistics to add efficiencies to alphabet encoding of all the world's languages?
34. Does Big-Oh notation allow us to predict running times more actually than a stopwatch?

Medicine

35. To what extent was Watson helpful in providing AI support to doctors?
36. In what ways can COVID data predict social justice indicators?
37. How can statistical modelling of emergency room data help to fine tune hospital staffing?
38. In what ways and with what results did vaccine research during the COVID epidemic change medicine?
39. What does DNA modelling teach us about human characteristics?

Engineering

40. How did the statistical analysis of the Quebec bridge collapse of 1907 change engineering in Canada?
41. What does statistical analysis teach us about the strength of the Pantheon? Matrimandir?
42. How did the design of the Jinghang Waterway change ancient Chinese water management?
43. What can statistics teach us about the strength of triangles? The arch? The I-beam?
44. To what extent were the Incan rope bridges effective engineering solutions to their environment?
45. What engineering challenges exist in space and how can statistics help us to understand them?

Technology Use

46. Is advertising budget the most important predictor for video game sales?
47. To what extent does country-of-origin influence an e-sport's players standing?
48. Does increased cell-phone use decrease teenager's social skills?
49. Can self-tracking on a fit bit help a person to understand their own health better?
50. Out of the original 151 Pokémon, which are the strongest and why?

Marine Life

51. What does statistical modelling tell us about the great-pacific garbage patch?
52. How has increasing lake acidity affected lake ecosystems in Algonquin park?
53. What can data-logging teach us about long-living birds such as puffins?
54. How do deep-sea creatures statistically differ from those closer to the surface?
55. What can statistics tell us about the impact of environmental change on the coral reefs?

Fashion

56. How can fashion brands more accurately predict sizing?
57. What impacts has fast-fashion had on fabric waste?
58. How can statistics help us to understand the properties and potential of new materials for use in fashion?
59. How can fashion brands make more accurate predictions? How can they influence user choices?
60. In what ways can smart fabrics (smart textiles) gather and process information?
61. How can programmable weaving change fashion?

Randoms

62. How can statistics be used in crime scene investigation?
63. To what extent are fingerprints unique?
64. How reliable is human memory?
65. How reliable is expect testimony in court cases?
66. What can the "Scotty" skeleton tell us about T-Rex dinosaurs in general?
67. In what ways and with what results can statistics be used to understand early human skeletons?
68. What does data-logging teach us about grizzly bear populations?
69. How can dinosaur footprints be used to extrapolate height?
70. What statistical patterns exist in the Dresden codex (Mayan book about math)?
71. How can we learn more about Iniskim Umaapi (Majorville Medicine Wheel) using statistics?
72. How are postal codes used in data mining?