Recruitment

(Search Ranking Algorithm)

a. You have been employed at your job for a number of years and feel you're ready to step up into a new role. You go online and pull up a search engine (e.g. Google or Yahoo). In the search bar you type in relevant keywords, for example 'truck driver jobs hamilton', 'senior corporate jobs wellington', or 'health worker job vacancy christchurch'. Within seconds the results are pages of listings for job and career websites, recruitment agencies and vacancies from various organisations. Ads feature first and are followed by general listings.

The search engine uses an algorithm to sift through millions of websites to give you useful and relevant listings. It considers factors such as keywords, site-speed, your location, and usability to determine which sites are likely to give you the answer you are looking for.

In the process of searching for a job you visit a number of different websites for information on how to write a CV, locations of organisations, tips on job hunting, and how to prepare for an interview. **This activity is automatically recorded by the search engine. It also records any information you provide whenever you sign up to a digital account such as your name, email and date of birth.**

Recruitment

(Talent Selection Algorithm)

b.

You see a vacancy online that you are interested in and submit a CV with the organisation. As part of their internal filtering process **the organisation uses an algorithm to help them efficiently process the 167 applications they receive and ensure they get the right candidate for the job.**

The algorithm not only analyses the information on your CV but also phrases and words, including sentence length, paragraphs, and key words, in order to delve deeper into the analysis of you as a candidate. From here it makes a recommendation on your likely initial match for the role which will determine if you are put forward to the next stage of the recruitment process.

You are identified as a desirable candidate and are successful in getting through to the next stage of the employment process.

Youth Support

(Not in Education, Employment or Training: NEET Algorithm)

a. Your 16 year old daughter Nikki, who has recently left school, receives a call from a local community worker offering her help as an early school leaver. The worker says Nikki has been flagged as being highly likely to benefit from help in accessing education, training or work-based learning. Nikki is being offered the services of a youth coach to assess her needs and develop a plan including education and training. It's up to Nikki as to whether she accepts this assistance or not.

You and Nikki check out the website provided. The community worker is part of the Ministry of Social Development's (MSD) youth service called NEET — 'Not in Education, Employment or Training' — designed to proactively identify young people who are missing out on basic education and training opportunities, and to offer them support.

These young school leavers are identified by MSD using an algorithm which draws on a range of information including Nikki's education records (achievement, truancy history and reason for leaving school), you and your partner's MSD benefit histories, and any Oranga Tamariki notifications. The algorithm produces a risk score linked to the likelihood of Nikki needing to be on a benefit as a young person. Young people with high risk scores are referred to community providers like the one that contacted your daughter.

Youth Support

(Not in Education, Employment or Training: NEET Algorithm)

b. Some time later you read in the news that the NEET scheme is checked regularly to measure how accurately it identifies young school leavers who are actually in need of support.

A recent check reported that there is a 79% chance that the risk score reflects the actual level of risk. MSD describes 79% as a level of algorithmic accuracy which is 'generally accepted as good accuracy'.

An evaluation of the programme writes: "We find that NEET raised the educational retention of participants in the first year, by up to 9%. This positive impact is sustained for around one year. Further qualification achievements however are quite modest, at 2%. There is no improvement in their likelihood of being employed, and the number of times they accessed the benefit were slightly raised."

Immigration

(Risk Assessment Algorithm)

a. Your friends, a sister and brother, are hoping to move to New Zealand to live. Both are university educated, neither have criminal records, and they are well off. They apply to Immigration New Zealand in their home country to immigrate to New Zealand.

New Zealand's immigration system applies an automatic triage system (a risk score algorithm) which assesses all visa applicants using risk rules. Regardless of the risk score, every application has a case manager involved in assessing it. The risk score determines how much work a case manager needs to do — for instance, a high score may mean more in-depth verification of the applicant's documents when when determining whether or not to issue a visa. The algorithm also reduces the time it takes to process a visa application.

The sister gets an entry visa and the brother is refused entry to New Zealand.

Immigration

(Risk Assessment
Algorithm)

b. The brother appeals to the New Zealand Immigration and Protection Tribunal, providing them with detailed information about his specific situation.

The Tribunal assigns a case manager who assesses the brother's appeal and checks if Immigration New Zealand's algorithm has assessed him correctly. The criteria the algorithm applies is deemed correct, however, the Tibunal finds there are good reasons to make an exception and approve the brother's appeal.

The brother is told to resubmit his appeal application and provide Immigration New Zealand with the additional information. His visa is subsequently approved.

Criminal Justice

(Risk of ReConviction x Risk of Imprisonment Algorithm — ROC*ROI)

a.

You read an article from your local news provider about a system the Department of Corrections uses to assess the risk of re-offence and imprisonment of criminal offenders.

The ROC*ROI algorithm (Risk of ReConviction x Risk of Imprisonment) has been used in New Zealand since 2001 to produce a risk score about the probability of an offender re-offending within a certain period following their offence and is based "on the behaviour of the individuals in the underlying data set". The score uses variables such as age, sex, frequency of offence, severity of crime and time spent in prison to produce a risk scale of low, medium or high for an offender. It does not use ethnicity data.

ROC*ROI has been used because research has shown that even simple risk scales (i.e. a checklist of risk factors) invariably outperform the clinical or professional judgements of trained experts and experienced correctional staff when making predictions about future offending.

The risk score alone does not decide the fate of the offender but allows Corrections and Parole staff to use this information alongside other data to make decisions about future prison costs, eligibility for rehabilitation programmes and whether an offender should receive bail or parole.

Criminal Justice

(Risk of ReConviction
x Risk of Imprisonment
Algorithm — ROC*ROI)

b. Later that week you read a response to the same article written by a collective of social workers and researchers who review the ROC*ROI tool against common definitions of fairness. They point out that the **statistical fairness of the tool can be challenged because "if some groups are subject to more surveillance and conviction rates than others, then this skews the data used to inform the predictions."**

The article also discusses the social fairness of the ROC*ROI tool, suggesting that **"while ethnicity is not used in the ROC*ROI algorithm, every other variable such as age at first offence, frequency of conviction, and number of convictions will over-identify Māori as being at high risk."**

The article concludes by questioning whether the ROC*ROI tool is a statistically and socially fair way of informing decisions about eligibility for bail, parole and rehabilitation programmes.

Health

(Waiting List Priority Scoring System)

a.

You are on the waiting list for a kidney transplant.

You have been informed by your local District Health Board **that operations such as yours are prioritised by a nationally-recognised algorithm which gives you a priority score based on how urgently you need the surgery and how much you will benefit from it compared to other people.**

You have recently advised your specialist at the hospital that your condition has worsened, but you're still waiting for an operation date. You also know a family friend who is awaiting the same procedure — and you're both surprised when they receive confirmation of their operation, because their situation does not seem as urgent as yours.

Health

(Waiting List Priority Scoring System)

b. Some time later you read in the news that a District Health Board is testing a new model to prioritise Māori and Pacific patients to cut their waiting times for some surgeries. The article states that a new approach is needed to address the fact that "on average, Māori will die seven years earlier than Pākehā".

The new model will apply an algorithm where Māori and Pacific ethnicity will be used to help rank patients for surgery. In addition to this, the DHB will set up "Māori and Pacific clinical leadership and advisory groups, hire care navigators to manage Māori and Pacific patients through the system and ensure their care isn't unnecessarily delayed, and test different approaches to applying an equity adjuster to the current surgical waitlist."

Media

(Machine learning algorithm)

a. It's Friday night. You log into your entertainment service provider account (e.g. Netflix, Neon, TVNZ OnDemand) and see a range of shows available to watch.

The entertainment service provider uses an algorithm to curate content based on your previous viewing choices and those of users who are similar to you. It aims to retain you as a subscriber by presenting you with content you are likely to be interested in and saves you time scrolling through content which is of no interest to you.

Once you have watched a show, there is an option to select the 'thumbs up' or 'thumbs down' icon to indicate whether or you liked it or not. **The provider uses this data to further refine the content it recommends to you.**

Media

(Machine learning algorithm)

b.

After binge watching shows during lockdown you're starting to find it difficult to find new and interesting shows to watch. In fact, the recommendations you are given are starting to feel like an echo chamber of what you *have* watched rather than what you would *like* to watch.

Your provider introduces an update to its service where customers can further customise their preferences by selecting from a list of general topics. The topics include a wide range, from politics and spirituality to wellbeing and music.

By selecting topics you are interested in, your provider is able to further refine its recommendations to you.