Mr. HANS VAN MIERLO STICHTING

Algorithms and Local Government

Opportunity for everyone?

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elf

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Summary

This paper investigates the rise of algorithms in government policy. Increasingly, algorithms (digital decision formulas), rather than people, decide how people are treated by the government. This is a trend identified in countries across the European Union. The paper focuses primarily on the use of algorithms at the municipal level in the Netherlands. This choice was made because little is currently known about this domain, while local Dutch governments lack knowledge and expertise, and decisions made at this level fundamentally affect people's lives. Examples of this are education, healthcare, and social security.

Additionally, this paper will illustrate how the uncurbed use of algorithms may form a threat to important liberal values, such as equality, freedom, and rule of law. Therefore, a national as well as EU-wide discussion on the use of algorithms in relation to the safeguarding of liberal values is essential. A set of council questions is attached in the addendum, as this research demonstrates the difficulty of establishing to which degree municipalities use algorithms to assist decision-making. Local representatives in the Netherlands have submitted these questions to their council to develop a better understanding of the current situation.

“It is increasingly *algorithms* (digital decision formulas), rather than people, that decide how people are treated by government.”

Introduction

Imagine being suspected by the municipality of benefit fraud on the basis of your postal code. Or receiving a higher sentence because of your cultural background. Or being reprimanded by an education officer, due to your supposedly higher risk of dropping out. It is increasingly *algorithms* (digital decision formulas), rather than people, that decide how people are treated by government.

In the United States, courts of law use COMPAS, software that uses algorithm-composed profiles to predict which prisoners have a high risk of recidivism.[1] Judges use this to determine a person's sentence. In the United Kingdom, the police uses facial recognition software to track criminals.[2] And in China, even the facial expressions of students in class are monitored.[3]

In the Netherlands, too, algorithms are often used. The tax office uses them to calculate rental subsidies or healthcare benefits. At the Care Needs Assessment Centre (*Centrum Indicatiestelling Zorg*, or CIZ), algorithms help decide whether people have a right to long-term healthcare.[4] The police uses the Crime Anticipation System (CAS) to predict crime, using algorithms. Probation Service Netherlands (*Reclassering Nederland*) uses algorithms to calculate the risk of recidivism.[5] Municipalities also make liberal use of algorithmic applications.[6]

Rise in criticism

The use of algorithms is not necessarily a bad thing. Governmental organisations indicate that algorithms contribute to a better, more efficient execution of processes.[7] But using algorithms to (help) make policy decisions is also risky. For example, research bureau ProPublica showed that the COMPAS system assigned a high risk of recidivism to Americans of colour twice as often as it did to white

1. Larson et al., 'How We Analyzed the COMPAS Recidivism Algorithm'.
2. Gayle, 'Met Police Deploy Live Facial Recognition Technology'.
3. Francis Chan, 'A school in China is monitoring students with facial-recognition technology that scans the classroom every 30 seconds'.
4. De Jong and Schellevis, 'Overheid gebruikt op grote schaal voorspellende algoritmes, "risico op discriminatie"'.
5. NOS, 'Kans op etnische profilering bij algoritme van reclassering'.
6. Doove and Otten, 'Gebruik van algoritmen door overheidsorganisaties', 5.
7. Ibid., 7.

Americans.[8] In January 2020, a Michigan man was wrongly accused of committing a crime, because the facial recognition software the police was using mistook the man for the culprit.[9] Facial recognition software has proved to be wrong before, particularly in recognising people of colour, as the software is more commonly trained on white people.[10]

In the Netherlands, too, there is a growing awareness of the risks of the use of algorithms in public policy. In the report *Upgrade. Safeguarding Public Values in The Digital Society (Opwaarderen. Borgen van publieke waarden in de digitale samenleving)*, the Rathenau Institute argued that the use of algorithmic systems can pose a threat to public values such as autonomy, privacy, and equal treatment.[11] The Netherlands Scientific Council for Government Policy (*Wetenschappelijk Raad voor het Regeringsbeleid*, or WRR) cautioned against the increase in inequalities between societal groups when big data applications are applied incorrectly.[12]

In 2018, a group of champions for privacy filed a lawsuit against the Dutch state due to the *System Risk Indication* (SyRI): a fraud detection system based on large amounts of data, which was used in several places, including Rotterdam. In February 2020, the judge ruled that the system was in conflict with the European Convention on Human Rights. It was stated the system is a breach of privacy and insufficiently transparent and verifiable, which may cause it to have discriminatory and stigmatising effects.[13] In April 2020, State Secretary for Social Affairs and Employment, Tamara van Ark, announced the discontinuation of SyRI, but in that same month the Ministry of Justice and Security proposed a law named 'Information Processing through Cooperation'.[14] Critics call this proposal 'Super SyRI', as it once again involves an algorithmic system to be used for fraud detection, but this time with increased possibility for exchanging information between organisations.[15]

Algorithms and the government

At the level of local government, decisions are made that affect people's lives in a fundamental way, such as access to social security and police presence

8. Angwin et al., 'Machine Bias'.

9. Hill, 'Wrongfully Accused by an Algorithm'.

10. Ivanova, 'Why Face-Recognition Technology Has a Bias Problem'.

11. Kool et al., 'Opwaarderen', 6.

12. WRR, 'Big Data in Een Vrije En Veilige Samenleving'.

13. Rechtbank Den Haag, *SyRI*.

14. Ministerie van Justitie en Veiligheid, 'Slimmere aanpak criminaliteit door betere uitwisseling van gegevens'.

15. Hofmans, 'WGS of "Super SyRI"'.

per neighbourhood. The financial constraints of many municipalities push them towards making policy that is as efficient and effective as possible. This adds to the pressure on municipalities to engage with new technologies.[16]

Big data and *data mining* (searching for correlations within large datasets) can help make public governance more efficient and effective. It is therefore not surprising that local governments make use of these technologies. A study performed by Statistics Netherlands (*Centraal Bureau voor de Statistiek*, or CBS) suggested that 50% of responding municipalities use algorithms.[17] A study by the Joint Research Centre, the science and knowledge service of the European Commission, has identified seventy applications of algorithms in public services by local governments across Europe, including Denmark, Spain, the United Kingdom and Norway.[18]

All that data must be correctly processed, with respect for human rights and public values. This requires knowledge and expertise, which municipalities often lack.[19] Oftentimes, algorithms are simply bought from software suppliers. There is currently insufficient insight into *how* those algorithms are used by municipalities and other government organisations, and whether there are sufficient safeguards from harmful use.

This paper will illustrate the risks of algorithms in the context of core liberal values, such as equality, freedom, and rule of law. §1. will provide a brief explanation on how algorithms work. §2. will illustrate how local governments apply algorithms. §3. will discuss how values such as equality, freedom, and rule of law are put under pressure by the use of algorithms. §4. will discuss how algorithms may be applied in a 'fair' way, and thereby offer opportunity for expanding equality and freedom. §5. consists of concluding remarks. The addendum contains a set of council questions, a tool for local representatives who wish to create a better understanding of the current situation in their municipality.

What political steps have been taken?

At the World Economic Forum in January 2020, Dutch prime minister Mark Rutte acknowledged the importance of worldwide standards for decisions made by artificial intelligence.[20]

16. Meijer, Schaefer, and Branderhorst, 'Principes voor goed lokaal bestuur in de digitale samenleving', 10.

17. Doove and Otten, 'Gebruik van algoritmen door overheidsorganisaties', 5.

18. Misuraca, and Van Noordt, 'Overview of the use and impact of AI in public services in the EU'.

19. VNG, 'Kennis van en voor gemeenten', 12.

20. World Economic Forum, *How to Survive the 21st Century | DAVOS 2020*.

The Dutch parliament appointed a temporary committee for a *Digital Future*. In May 2020, this committee published the report *Update Required*. It argued, amongst other things, that 'a comprehensive legal framework on digitalisation' is necessary.[21]

The Dutch Ministry of the Interior and Kingdom Relations is developing a 'human rights impact assessment', and a set of data principles for public governance. One of its goals is to prevent discrimination by AI-applications.[22] Additionally, the Netherlands Court of Audit (Algemene Rekenkamer) is researching the use of algorithms by the government and is working on a framework to review algorithms.[23]

The European Commission, too, is active in the field, now that the use of AI has become of geopolitical concern. While AI-policy in the US seems to put profit first, and increases the power of the state in China, the European Commission wants AI to serve societal values. In February 2020, the European Commission published its AI-strategy, which argues for AI-policy based on European values and fundamental rights, including protection of privacy and human dignity.[24]

In 2018, the G7 committed to AI focused on humanity and society.[25] Due to the Corona crisis, governments have been quicker to clutch at digital tools. China and South Korea swiftly launched apps that controlled public life. Various governments used the geo-locations of phones to trace the movements of Corona patients.

In the Netherlands, the Minister of Health, Hugo de Jonge, announced at the start of April 2020 that similar apps would be introduced to trace contact and to monitor symptoms.[26] In response, a group of experts, organisations, and scientists published a manifesto named *Safe Against Corona*.[27] They were concerned about the privacy and social consequences of a *contact-tracing app*. The app called CoronaDetector (*CoronaMelder*) was tested in August 2020, and implemented nationally on the 1st of September 2020.[28]

The conviction that technological developments form solutions to (social) problems is sometimes referred to as technosolutionism. It is often problematic,

21. Buitenweg et al., 'Update Vereist'.
22. Dekker and Knops, 'Kamerbrief'.
23. Algemene Rekenkamer, 'Aandacht voor algoritmes'.
24. European Commission, 'White Paper on Artificial Intelligence'.
25. G7 Innovation Ministers, 'G7 Innovation Ministers' Statement on Artificial Intelligence'.
26. De Jonge, 'Kamerbrief over stand van zaken coronavirus / COVID-19'.
27. Bits of Freedom, 'Bescherm onze gezondheid, maar bescherm ook onze rechten'.
28. Ministerie van Volksgezondheid, Welzijn en Sport, 'Landelijke invoering coronavirus-app CoronaMelder gepland op 1 september'.

because it disregards the problem the technology is meant to solve, and the scientific rationale for the use of this technology.[29] This means that certain societal consequences may go unnoticed.[30] The Netherlands Scientific Council for Government Policy cautions against this form of optimism, as it may cause us to lose sight of important values.[31]

29. Stikker and Boerwinkel, '"Geloven in een app als dé oplossing is niet intelligent"'.

30. Austin, 'Technologie is geen doel op zich, en geen waardenvrij gereedschap'.

31. Sheikh and Prins, 'Artikel'.

“The more complex an algorithm is, the more difficult it is to understand how it gets to its outcomes.”

What are algorithms? §1.

We use algorithms every day, often without noticing. An algorithm is essentially a series of instructions, performed step by step, to solve a problem. Examples are navigation systems that sequentially calculate the shortest route. Complex algorithms are complicated flowcharts or calculations that are made with the help of Artificial Intelligence (AI). Thanks to an enormous amount of data, or *big data*, and the expanding calculation power of computers, it is possible to create algorithms that are 'self-learning'. When computers learn on the basis of large datasets, this is called machine learning. Two forms of machine learning are *supervised* and *unsupervised learning*.

Supervised learning means that a computer recognises correlations based on a pre-labelled dataset.[32] Within this dataset, it is indicated which category information belongs to. An example could be the category 'people who have committed fraud in the past'. The computer searches for correlations between this category and other categories, such as 'people who are in debt'. The algorithm is then able to create a new dataset and for example estimate how likely a person is to be currently committing fraud.

Unsupervised learning means the computer searches for patterns within unlabelled datasets. The computer independently attempts to find correlations that distinguish data from each other and then divides that data up into groups or clusters that are similar.[33] The data must then be interpreted further by a person.

Algorithms can be used to create profiles using characteristics such as gender or place of birth, but also seemingly less sensitive characteristics, such as taste in music or hobbies. This is called *profiling*. Tech companies earn billions with algorithmic profiling. People are shown news articles or adverts that were specifically meant for them, because the algorithm indicates a high probability this content leads to a purchase or certain voting behaviour in that particular person.

Municipalities and government organisations also take part in profiling. The notorious System Risk Indication (SyRI) is a good example of this. The municipality

32. Totta data lab, 'En je volgende serie op Netflix wordt...'

33. Mishra, 'Unsupervised Learning and Data Clustering'.

of Nissewaard also tries to investigate benefit fraud using profiling.[34] From the moment profiles are created on the basis of, for example, ethnic background or gender, this can lead to forms of unjust and unequal treatment. To illustrate, in May 2020 it was revealed that the Dutch tax office selected people with a dual nationality for extra checks regarding declarations.[35] This meant that over 11,000 people with dual nationality were reviewed more strictly between 2012 and 2015.[36] This was discrimination. Similarly, in a recent scandal regarding benefits, it became clear the Dutch tax office had registered people's nationalities.[37]

The more complex an algorithm is, the more difficult it is to understand how it gets to its outcomes. Explaining that someone has a right to benefits when their income is under a certain threshold is simple. But what if the outcome is based on over a hundred, or maybe even a thousand variables? In such a situation, it can be practically impossible to explain the process that led to a certain result. This is often referred to as a *black box-algorithm*. It means that only the input (the training data) and the output (the results) are known, but not the process in between. These black boxes perpetuate the image many people already have of technology: complicated, mysterious, and elusive.

During a parliamentary debate in 2018, the Dutch Minister for Legal Protection called algorithms 'very complicated digital decision-making formulas' that could be incomprehensible to the average citizen. Although complex algorithms may make it more difficult to explain certain decisions, the government still has a responsibility to create transparency. In a democracy, it is essential that people have insight into how decisions are made. In this respect, the Rathenau Institute cautions against 'information asymmetry' between government and citizen, in which 'the citizen becomes increasingly transparent while the government becomes increasingly opaque'.[38]

34. Groot Nissewaard, 'FNV'.

35. De Witt Wijnen, 'Verwijt van etnisch profileren niet nieuw'.

36. Kleinnijenhuis, 'Belastingdienst erkent'.

37. Autoriteit Persoonsgegevens, 'Belastingdienst/Toeslagen: De Verwerking van de Nationaliteit van Aanvragers van Kinderopvangtoeslag'.

38. Kool et al., 'Opwaarderen', 73.

“It is remarkably difficult to gain insight into the way in which municipalities apply algorithms”

How do local governments in the Netherlands apply algorithms?

§2.

Various municipalities apply algorithms in the implementation of policy.[39] Some algorithmic applications seem relatively uncontroversial. The municipality of Amsterdam uses an algorithm to calculate the optimal route for collecting the city's rubbish.[40] Other applications are more striking and possibly have extensive (social) consequences.

Almere and the Street Cube

The municipality of Almere has set the goal to address social-economic and safety issues on a neighbourhood basis.[41] To achieve this, they use a statistical tool that maps the standard of living of every street on the basis of gender, age, and property type. This tool is called the Street Cube. Percentages of 'non-Western immigrants', divorced people, and people who receive debt support are also included in the model. According to the municipality, the tool does not offer a value judgment, and is simply used as an instrument supporting civil servants entering into conversation with for example the police, housing corporations, and schools. The municipality of Den Bosch also uses a statistical tool to create insight into the standard of living. 'Non-Western immigrants' is one of the three indicators that determine whether a neighbourhood has developed favourably or not with regard to the category 'coexistence'.

Rotterdam and the System Risk Indication

The previously mentioned SyRI was used in Rotterdam, Eindhoven, Haarlem, and Capelle aan den IJssel to detect social security fraud.[42] In this model, sixteen different kinds of data were compared (from housing and debt data to identification details, such as name, address, city of residence, and gender). The

39. Ministerie van Binnenlandse Zaken, 'Besluit Wob-verzoek over informatie en/of documenten naar het gebruik van algoritmen binnen de overheid'.
40. Ibid.
41. Gemeente Almere, 'Programmaplan Wijkgericht Werken 2015-2019'.
42. Rechtbank Den Haag, *SyRI*.

model was called to a halt in February 2020 by a judge. In April 2020, the State Secretary for Social Affairs and Employment announced the discontinuation of the system. She also announced the development of a new and improved instrument.[43]

Tilburg and protective custody of children

The municipality of Tilburg and several smaller surrounding municipalities have started a project in which big data and machine learning are used to predict protective custody of children. Based on indicators including the age of the parents, family history, and the body mass index of the child, a prediction is made for the households in which protective custody may be necessary, presently or in the future.[44] Even social media information is taken into account. The primary risk category is 'young single mother, unemployed, living in a rental property'.[45] Researchers involved in this project have expressed a wish not to stigmatise: 'The most important thing for us is what is best for the child.'

Dordrecht and school drop-outs

The municipality of Dordrecht uses a prediction model to keep an eye on potential school drop-outs. Here, variables such as education level, type of education, the result and the numerical code (often including postal code) of the most recent exam are used. Only people over 18 are included in the model. Those with the lowest risk of dropping out only receive a warning letter, those with a higher risk are approached for an appointment with an education officer.[46] The group with the highest risk has an education officer at their front door within a week. The municipality states it is important that the system works ethically and protects privacy. The municipality of Zaanstad uses a similar model to calculate risk levels for potential school drop-outs.

National organisations locally active

The cases mentioned above are illustrative of the way in which local governments use algorithms to implement their policies. However, some national organisations are also active at the local level. An example of this is the Ministry of Home Affairs using a so-called 'liveability-meter' to map the standard of living in various

43. Ministerie van Sociale Zaken en Werkgelegenheid, 'Kamerbrief naar aanleiding van vonnis rechter inzake SyRI'.
44. CentERdata, 'Factsheet: Het Voorspellen En Voorkomen van Kindermishandeling Door Middel van Machine Learning'.
45. Eikenaar, 'Nieuwe aanpak in jeugdzorg'.
46. Dienst Gezondheid en Jeugd Zuid-Holland Zuid, 'Data Gedreven Aanpak Verzuim 18 Jaar: Evaluatie'.

municipalities. In this model, the amount of 'Eastern European nationals'[47], 'Turkish', 'Moroccans', 'Surinamese' and 'Non-Western immigrants' has a negative effect on the standard of living.[48] According to the Ministry, this monitor can be used by municipalities for policy preparation.[49] The police, another organisation intimately involved in developments in local government, uses the Crime Anticipation System. Here, algorithms predict the probability of criminal activity occurring at a certain time and place.[50] It is understandable that the police feels the need to control those areas with an increased chance of criminal activity more often, but there is the risk of a self-fulfilling prophecy, because it is likely that more criminal activity is recorded in neighbourhoods with more police presence.

Lack of transparency

It is remarkably difficult to gain insight into the way in which municipalities apply algorithms. Sometimes that is due to the murky role of algorithms in decision-making, varying from decision-making systems to support systems that guide civil servants in a certain direction. But mostly it is because municipalities very rarely proactively offer information on their website. From experience, one learns it is necessary to actively search for this information, for example by approaching civil servants or speaking to specialised researchers affiliated with universities. For local council members it is also difficult to monitor the application of algorithms. Most importantly, few local council members keep an eye on the digitalisation of their municipalities, while they have a duty to review this policy and take partial responsibility for it.[51]

The fact that there is an important role for local council members and councillors in the application of algorithms is illustrated by the municipality of Enschede. At the initiative of council member Vic van Dijk (D66) a public register has been introduced through which the municipality offers a certain degree of insight into their data processing.[52] Additionally, thanks to councillor Eelco Eerenberg (D66), an ethical committee has been established, in which an independent and interdisciplinary team of experts considers ethical questions concerning the use of algorithms.[53]

47. Centraal Bureau voor de Statistiek, 'MOE-landers'.
48. Leidelmeijer et al., 'Leefbarometer 2.0: Instrumentenontwikkeling'.
49. Ministerie van Binnenlandse Zaken, 'Leefbaarometer Help'.
50. Ministerie van Binnenlandse Zaken, 'Besluit Wob-verzoek over informatie en/of documenten naar het gebruik van algoritmen binnen de overheid'.
51. VNG, 'Informatievoorziening is een onderwerp voor de raad'.
52. Gemeente Enschede, 'Register verwerkingen'.
53. Gemeente Enschede, 'Ethische Commissie'.

“The fairness of algorithms depends on the choices made during their design process and their use.”

Equality, freedom and rule of law

§3.

Efficient and effective policy is a just pursuit. It saves public resources that can then be used for achieving other noble goals. But this is not to say that we should automatically use every system that might optimise efficiency and effectiveness. Algorithms are not inherently fair or unfair. The fairness of algorithms depends on the choices made during their design process and their use. The way an algorithm works and what its calculations are based on, are foremost a reflection of the convictions of its creator. It is up to the creator to select the data through which the algorithm is trained and to decide what is done with the results.[54]

For example, is it justified to subject people to extra checks for benefit fraud based on their postal code? If so, is it then also justified to offer people free debt support, retraining, or a language course based on their postal code? And what if the selection is not based on postal code, but on employment or reintegration information? The appeal of certain variables depends on the context. Most importantly, the social and societal consequences of algorithmic systems can be vast and its values can be contradictory. This makes these choices inherently political.

§3.1 A liberal perspective

To judge whether algorithms pose a risk to a just society, they can be reviewed using three liberal core concepts: equality, freedom, and rule of law.

Here, equality refers to equal opportunity: all individuals should in principle have equal opportunity to develop themselves in a way that is desirable to them. The possibilities available to an individual should not depend on factors that *should* not be relevant, such as gender, ethnicity, sexual orientation, or social-economic starting point. These factors are morally arbitrary. Instead of these factors, an individual's opportunities should only be determined by her own choices and efforts.

Freedom refers to the freedom of every individual to shape their own life according to however they see fit. This means that the government must make

54. O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, 21.

sure the individual is free *from* discrimination or arbitrary disadvantage. However, this also means that the government has a role to play in creating circumstances in which the individual is *free* to develop herself and make her own choices.[55] An example of this duty could be for the government to invest in good, accessible and tailored education.

Rule of law means, among other things, the safeguarding of a balanced trias politica (separation of powers), within which the legislative, executive, and judiciary power are able to function according to their purpose. Transparency, explicability, and verifiability of the executive power are necessary to achieve this.

§3.2 Profiling and equality

The Dutch Law of Equal Treatment states that equal cases must be treated equally. Discrimination is the very instance in which this does not happen. There is a distinction between *direct* and *indirect discrimination*. Direct discrimination refers to a person being disadvantaged due to a personal characteristic. Indirect discrimination occurs when a distinction is made on a seemingly neutral basis, but the individual is still disadvantaged as a result.[56] For example, an algorithm can select on postal code, but if there are many individuals with a migration background living in the area of that postal code, it is still possible that the algorithm leads to indirect discrimination on the basis of ethnicity. In this case, the variable 'postal code' serves as a *proxy*, tightly connected to ethnicity.

Making (in)direct distinction is permitted as long as there is a well-founded reason. For example, the ban on serving alcohol to minors does not count as unjust ageist discrimination, and when raising tax, we do not see it as unacceptable that the tax office takes income into consideration.

Algorithmic bias and increasing inequality (of opportunity)

When certain individuals or groups are systematically discriminated against, this means the system is *biased* or prejudiced.[57] With a biased system at the foundation of decisions that affect people's lives, equal opportunity is in jeopardy and existing inequality is increased. Usually, algorithms are not purposefully made to be biased, but the model is formed by people with (subconscious) preconceptions. This might

55. Brummer, *Wat is sociaal-liberalisme?*, 13.

56. College voor de Rechten van de Mens, 'Gelijke behandeling wettelijk verplicht'.

57. Friedman and Nissenbaum, 'Bias in Computer Systems'.

lead to biased data the algorithm is trained with (*data bias*). It might also lead to biased design (*design bias*). Both of these biases give unfair results.

The danger of data bias

One cause of data bias is the use of a *tainted example*. This means that the input data for an algorithm has been based on prejudiced historical information. An example of this is when Amazon was seeking new employees for their tech department. An algorithm created a profile for desired candidates, based on the resumés of current employees. There was not a single woman among the applicants the algorithm had selected as suitable. At that time, the department consisted exclusively of men. The algorithm had rejected every resumé that contained words like 'women' (for example, 'women's chess club president'), because these words did not appear anywhere in the male employees resumés, which had been used to train the algorithm.[58] In this way, a computer system can perpetuate discrimination and eventually automate and increase existing inequality.

The danger of design bias

There can also be design bias, for example when the variables in the model have been selected incorrectly. This is sometimes called biased values in design or *biased feature selection*.[59] In this case, the characteristics used to make a selection produce unjustly disadvantageous results for a certain group. This was the case in the American software named COMPAS (*Correctional Offender Management Profiling for Alternative Sanctions*), which courts used to calculate the risk of recidivism among prisoners. The American research bureau ProPublica discovered this system would appoint a high risk of recidivism to an American of colour twice as often as to a white American.[60] The COMPAS survey included questions about employment history (had the individual been unemployed), financial stability (had the individual ever been hard up), and whether anyone in the individual's direct environment had been in contact with the police. Americans of colour generally score higher on these questions, which means they were assigned a higher risk (much) more often.[61]

58. Dastin, 'Amazon Scraps Secret AI Recruiting Tool That Showed Bias against Women'.

59. EPRS, 'A Governance Framework for Algorithmic Accountability and Transparency'.

60. Larson et al., 'How We Analyzed the COMPAS Recidivism Algorithm'.

61. Angwin et al., 'Machine Bias'.

The COMPAS system is an example of an algorithm containing biased characteristics. In this case, these characteristics were the survey questions. This was an example of how a system can be indirectly discriminatory by using seemingly neutral characteristics, which are in practice closely related to ethnicity, and thereby function as proxies. The COMPAS algorithm thereby contributes to increasing social and economic inequality between Americans of colour and white Americans. The model limits people's opportunities based on the colour of their skin or their ethnicity. In doing so, it is an explicit example of how society's pursuit for equality (of opportunity) can be put at risk by improper use of algorithms.

In the Netherlands, algorithms are also used to calculate the chance of recidivism. Probation Service Netherlands uses the model OxRec (*Oxford Risk of Recidivism Tool*) to calculate the probability an individual will commit another crime. This model is based on, among other things, gender, marital status, level of education, exposable income, and the 'social-economic disadvantage of residential neighbourhood'.[62] The 'social-economic disadvantage of residential neighbourhood' is calculated using characteristics such as 'benefits received', 'unemployment', 'education level', 'mobility', and 'level of crime'.[63] Researchers have called the quality of the model 'dubious' and fear Probation Service Netherlands and the judiciary are being led by 'predictions that are regularly inaccurate' and 'with a high risk of unequal treatment based on race, social class, or other existing social inequality'.[64] From the perspective of equal treatment and freedom from discrimination, this development is undesirable.

§3.3 Profiling and freedom

For liberals, freedom is related to self-determination. Individuals should have the possibility to make their own choices about how to shape their lives. As long as no harm is being done to others, the government should hold a neutral position on this, and not impede or facilitate any particular lifestyle.

This self-determination can be put under pressure by careless use of the predictive power of algorithms. In algorithmic profiling, predictions are often made regarding people's behaviour based on their personal or social characteristics. This can lead to granting aid, or increasing surveillance. But these measures can have a self-amplifying effect. This can result in a limitation to the freedom of individuals to determine the direction of their lives.

62. NOS, 'Kans op etnische profilering bij algoritme van reclassering'.

63. 'OxRec'.

64. van Dijck, 'Algoritmische risicotaxatie van recidive'.

The danger of social-economic prediction

In the US, a system that makes predictions about child abuse is in place (the '*Allegheny Family Screening Tool*'). This system attempts to predict whether child abuse will occur within a family, and does so using data of families who receive government aid (various forms of benefits).[65] Because only these families are included in the screening, they are the only ones subjected to checks. The result is that possible child abusers are primarily detected in this group of economically vulnerable Americans. Economically self-sufficient American families remain undetected, while it is not necessarily the case that child abuse does not occur within these families. In this way, people with a certain characteristic (receiver of government aid) are treated differently from people who do not receive benefits.

Most importantly, this model works as a self-fulfilling prophecy. Factors such as social isolation, material deprivation, and stress are all risk indicators and consequences of the model.[66] Families may for example avoid welfare workers out of fear of being subjected to extra checks. This evasive behaviour is also a risk factor in the model and increases the probability of being classified as a 'potential child abuser'. The denial of problems is also a risk factor in the model, while it is exactly something an innocent person would do.[67] Ultimately, the programme, originally designed to protect children of poor families, limits the freedom of this very group.

In the Netherlands, the System Risk Indication (SyRI) was used to create risk profiles of possible social security fraud. SyRI estimated whether someone could possibly commit fraud. This was done on the basis of employment details, debt information, but also on the basis of identifying characteristics such as gender, date of birth, and postal code. Multiple municipalities ran SyRI projects with names such as 'Address Fraud Afrikaanderbuurt in Rotterdam' and 'Vulnerable Neighbourhoods for Claiming Disability Benefits in Capelle aan den IJssel' and 'G.A.L.O.P. II' in Eindhoven. SyRI is an example of a system that could be described as poverty profiling, because the bias in the system possibly led to extra checks on people with 'lower social-economic status or an immigration background'.[68] This proved to be an unjust limitation of the freedom of a certain group.

65. Eubanks, *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor.*

66. Ibid., 169.

67. Ibid., 165.

68. Rechtbank Den Haag, *SyRI*.

69. O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, 84–104.

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The danger of judicial prediction

Predictive policing means that algorithms calculate the probability of the occurrence of criminal activity in certain neighbourhoods based on crime data. This calculation is then used to decide on the deployment of police. Cathy O'Neill describes how this process has triggered a so-called *negative feedback* loop in the US.[69] The preconceptions of police officers lead to more checks in neighbourhoods with mostly poor inhabitants, or inhabitants of colour. As a result, more data on crime from these neighbourhoods becomes available compared to other neighbourhoods. The effect of this unbalanced data is that the algorithm will predict a higher risk of criminal activity for these neighbourhoods. This in turn leads to more checks in those neighbourhoods, and the process repeats itself. In this case, the (subconscious) bias of the police officer is institutionalised, and then confirmed and perpetuated through the way the algorithm operates.

This illustrates how the algorithm can create a reality based solely on a prejudiced model: a reality in which people are exposed to more police surveillance based on a characteristic such as ethnicity. Research has shown that aggressive police surveillance can lead to increased dropping out of school and decreased registration for further education among high school students of colour.[70] Earlier research already demonstrated that police checks cause worse academic performance among African American boys.[71] Most importantly, it could also lead to decreased political involvement and lower trust in the government.[72] Here, too, the need for efficiency has its price: the individual's freedom to choose how to shape one's life is put under pressure by the (in)direct consequences of predictive policing.

The Dutch police force also makes use of predictive policing with the Crime Anticipation System (CAS). In May 2018, 115 of the 168 police teams in the Netherlands had access to this system.[73] CAS divides a municipality or city into squares of 125 by 125 metres. Within these squares, various data are used to create so-called *heat maps*. The colour of the area indicates how likely it is that criminal activity will occur there. This is consequently used to make decisions on police deployment. In this process, information such as police reports, crime

70. Badger, 'The Lasting Effects of Stop-and-Frisk in Bloomberg's New York'.

71. Legewie and Fagan, 'Aggressive Policing and the Educational Performance of Minority Youth'.

72. Weaver and Lerman, 'Political Consequences of the Carceral State'.

73. Ministerie van Binnenlandse Zaken, 'Besluit Wob-verzoek over informatie en/of documenten naar het gebruik van algoritmen binnen de overheid', 42.

74. Politie Nederland, 'Predictive Policing', 41.

numbers, the distance to known suspects, and demographic and socio-economic data from the Central Statistics Office is used.[74] The data from the Statistics Office consists of information such as the number of men and women in the area of that postal code, the average size and composition of households, fiscal monthly income, the average age, and the number of people receiving benefits.[75]

Just like in the US example, predicting criminal activity based on demographic and social-economic data is risky. CAS could indirectly make predictions based on ethnicity, because the currently used variables are strongly connected to ethnicity and thereby function as proxies.[76] When there are more checks in a particular neighbourhood, there is a risk that certain individuals or groups will be exposed more often to police surveillance, creating a negative feedback loop.

These examples demonstrate that individual freedom can be unjustly restricted when a biased algorithm is used to make decisions affecting people's opportunities. This is at odds with the idea that the individual should be able to determine the direction of her own life, and that the government should play a facilitating role in people's free development.

§3.4 Profiling and rule of law

For a democratic constitutional state, separation of powers is essential. The *trias politica* (the executive, legislative, and judicial power) keep each other in equilibrium. If one or more of the three powers in the *trias politica* can no longer perform her duty well, the separation of powers becomes unbalanced. A lack of transparency, explicability, and verifiability of mathematic models and systems municipalities use to execute their policies could cause such an imbalance. SyRI is an example of a situation in which the judiciary had insufficient insight into the execution of policy.

During the legal proceedings against SyRI, the Ministry of Social Affairs and Employment refused to disclose the algorithm and its risk indicators, because 'citizens would be able to adapt their behaviour to it'.[77] This meant the judge had practically no insight into the workings of the system. This lack of transparency from the executive power threatens to disrupt the balance of the *trias politica*. There is also the threat of previously mentioned technosolutionism: the existence

75. Oosterloo and van Schie, 'The Politics and Biases of the "Crime Anticipation System" of the Dutch Police', 6.

76. Ibid., 6–7.

77. Rechtbank Den Haag, *SyRI*.

of a practically unlimited trust of civil servants and leaders in the operation of algorithms. When a citizen asks for explanation, it is possible that she receives merely the result of the algorithm. Lack of explicability and verifiability is a serious issue, but it is at least as serious when civil servants or leaders themselves do not view it as such.

According to the Netherlands Scientific Council for Government Policy, the citizen is increasingly transparent to the government, while the government is increasingly opaque to the citizen.[78] The Council cautions against a Kafkaesque situation in which the government uses personal information to make hugely impactful decisions, while the people or their political representatives are unable to influence them.

Restoring the trias

To restore the verifiability of the executive power, and with it the balance of the *trias politica*, more transparency is required.[80] In a letter to parliament, the Minister for Legal Protection made a distinction between 'technical transparency' and 'explicability'. Technical transparency relates to publishing parts of the system, such as source codes or training data.[81] Explicability refers to the ability to express the results of the algorithm using language that is easily understandable. This is in line with the EU General Data Protection Regulation, which states that information about the algorithm should be made available in a succinct and comprehensible way.[82]

In 2018, parliamentarians Kees Verhoeven (D66), Kathalijne Buitenweg (GroenLinks) and Michiel van Nispen (SP) submitted a motion to publicise as many algorithms used by the government as possible. In response, Minister Dekker wrote in a letter to parliament that algorithms used by the government should be 'as transparent as possible'.[83] Governments have a duty to inform involved parties of their data being processed, when it is used for automated decision-making. These processes must be verifiable and transparent for stakeholders.[84]

However, publicising the algorithm can also have negative consequences.

78. WRR, 'Big Data in Een Vrije En Veilige Samenleving', 8.

79. Ibid.

80. EPRS, 'A Governance Framework for Algorithmic Accountability and Transparency', I–II.

81. Dekker, 'Kamerbrief', 3–4.

82. European Commission and European Parliament, 'General Data Protection Regulation'.

83. Dekker, 'Kamerbrief', 8.

84. Ibid., 7.

Examples are when transparency is at odds with privacy, when innovation is damaged by the disclosure of trade secrets, or when employment frauds are able to abuse the publicised information.[85] Moreover, transparency is no guarantee for verifiability. Explaining a complex, machine learning algorithm is much more complicated than explaining a simple flowchart.[86] Complete transparency of black box-algorithms can therefore produce more questions than answers. The right level of transparency depends on the context. Particularly for algorithmic systems that have an extensive impact on people's lives – such as fraud detection or granting benefits – verifiability and transparency are essential.

85. Ibid., 9.

86. Ananny and Crawford, 'Seeing without Knowing', 9.

“Algorithms have the capacity to offer valuable insights into improving equal opportunities for everyone.”

Fair algorithms

§4.

Algorithmic systems often make selections based on personal characteristics. Groups are formed based on characteristics shared by individuals, which then form the foundation for making predictions. This thinking in terms of groups can easily lead to discrimination, the limitation of freedom, and inequality of opportunity.

But algorithms are also able to serve a positive purpose, provided they are designed and used with care. Because algorithms help find correlations in large quantities of data, they can offer insight into existing prejudice and the patterns that keep social-economic inequality in place or even increase it.

Liberals primarily focus on the individual as a political and social unit. Individuals deserve equal opportunity and should be able to shape their lives however they want.[87] However, that does not mean we can be blind to reality. Groups and group characteristics are most definitely significant. We often see that opportunities in society are unequally distributed according to certain divides. These divides correspond with characteristics that people did not choose, such as gender, ethnicity, or being part of a social majority or minority.[88] Algorithms can help map out these divides and counter them. The complexity of issues concerning, for example, poverty and social security can be clarified in this way. With the help of algorithms, patterns can be studied and correlations between variables in large datasets can be established.[89] Algorithms have the capacity to offer valuable insights into improving equal opportunities for everyone, provided they are used under strict conditions, and with a single, well-defined goal.

A promising development in the use of algorithms is the *FairTrade algorithms* project. Here, the municipality of Amsterdam has entered into a collaboration with Statistics Netherlands to search for ways to combat bias in algorithms.[90] The project investigates whether the so-called *FairTrade* method can prevent personal characteristics, such as gender or ethnicity, from having an effect on the final result of the algorithm. This method estimates the causal relationship

87. Brummer, *Wat is sociaal-liberalisme?*

88. Hesselmans, *Kansengelijkheid is toe aan herkansing.*

89. Gemeente Den Haag, 'Datagedreven Werken Voor de Stad Datastrategie 2020-2022'.

90. Van der Sangen, 'Onderzoek naar eerlijke algoritmen voor beleid'.

between different variables. It then verifies if the result stays the same when the personal variable in the model is altered, including the causal effects this could have. Differences that are marked as undesirable can be corrected by the model. To illustrate: a municipality predicts the probability of fraud based on income. Research has shown that a person's income is significantly influenced by gender. This is corrected in the model, so that the individual's gender no longer influences the result. Personal characteristics are thus explicitly included in the method, with a fairer model as its objective. Additionally, the Civic AI Lab was opened recently. In this lab, the municipality of Amsterdam, the Free University, the University of Amsterdam, and the Ministry of Home Affairs investigate how AI-applications in, for example, education or healthcare can be fair and responsible.[91]

Most importantly, detecting and researching algorithmic bias can raise awareness about preconceptions and the various ways discrimination can take place. For example, researchers in the US discovered a bias in the algorithm that calculates the health risk of Americans. The scores of American patients of colour proved to be structurally underestimated, resulting in them not receiving correct care as often as white patients.[92] Research into the causes of this sort of bias increases understanding of the processes that keep inequality in place or increase it. This knowledge can be used to counter inequalities and to promote equality of opportunity.

91. Gemeente Amsterdam, 'Gemeente Amsterdam, de Vrije Universiteit en Universiteit van Amsterdam openen een lab voor maatschappelijke Artificial Intelligence'.

92. Obermeyer et al., 'Dissecting Racial Bias in an Algorithm Used to Manage the Health of Populations'; Ghebreab and Bosma, 'AI kan ons veel leren over onszelf'.

“The road
to change
can be found
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democratic process.”

Conclusion §5.

An algorithm is essentially a series of instructions, performed step by step to solve a problem. The more complex the algorithm, the trickier it may be to understand exactly how it works. Algorithms are not inherently fair or unfair. However, they can be made and/or used fairly or unfairly. This fairness depends on which core values are held. This is why value-driven thinking is necessary to determine the fairness of an algorithm.

Municipalities in the Netherlands make liberal use of algorithms.[93] This corresponds to an international trend of local governments increasingly relying on algorithms in public services.[94] This offers opportunity but is also a risk. Values such as equality, freedom and rule of law can be put in jeopardy. In this context, algorithms can reflect the (subconscious) preconceptions of people, which can lead to discrimination in decision-making. Algorithms can contribute to the increase of existing inequality and the limitation of individual freedom.

There is another way. If algorithms are developed and used with respect for fundamental rights and freedoms in accordance with liberal values, and with the objective of countering divides in society, there is an opportunity to promote the freedom and the emancipation of individuals. This way of thinking might be in line with the AI-strategy of the European Commission, that stated that AI should be human-centric and respect fundamental European values and human rights, such as human dignity, non-discrimination and privacy.[95]

It is up to liberal politicians to fight for a valuable deployment of new technologies, including local government. This will not be possible without knowing where and how they are currently being applied. The road to change can be found within the democratic process. For that reason, the addendum contains a list of technical questions that municipal council members can pose to their municipalities. It is up politicians to ensure technological development serves society, and not the other way around.

93. Doove and Otten, 'Gebruik van algoritmen door overheidsorganisaties'.

94. Misuraca, and Van Noordt. 'Overview of the use and impact of AI in public services in the EU'.

95. European Commission, 'White paper on Artificial Intelligence'.

Addendum: Council questions

1. Does the municipality use algorithms that are trained through supervised learning, or does she commission other organisations for this?

A. If so, for which issues does it use these algorithms? Is the creation of (risk) profiles of people a part of this?

B. How were these algorithms created?

C. What data does the municipality use to train these algorithms? What data does the municipality use to implement these algorithms?

Describe per algorithm of what type it is and what question it serves to answer. Then describe the algorithm's process, starting at data collection, data processing and coding/transforming, data analysis, the results, decoding, and the follow-up actions. What kind of data is collected and how is it collected? Which variables are included in the model and which are not? What does the output look like (for example, probability per individual)? How is it decided which variables are and are not included?

2. Does the municipality use algorithms that are trained through unsupervised learning, or does it commission other organisations for this?

A. If so, for which issues does she use these algorithms? Is the creation of (risk) profiles of people a part of this?

B. How were these algorithms created? (see explanation for question 1)

C. What (personal) data does the municipality use to train these algorithms? What (personal) data does the municipality use to implement these algorithms?

3. Is the municipality prepared to publish a public register in which she details and explains her algorithmic applications?

4. Is the municipality aware of the risks of the unethical use of algorithms, such as discrimination, stigmatisation, the limitation of individual freedom such as self-determination, and the preservation and increase of inequality? Which measures does the municipality take to mitigate the risks and counter the potential negative effects?

5. Is the municipality aware of (subconscious) choices in the use of algorithms that perpetuate the unethical use of algorithms?

6. Does the municipality include ethical aspects of algorithms in the purchase conditions for suppliers? If so, which conditions are they?

7. Has the municipality appointed an ethical committee, like Enschede has, that considers whether the municipality does or does not make ethical use of algorithms? If not, does the municipality see the value of appointing such a committee, and does she consider doing so?

8. Is the municipality prepared to perform an (annual) audit to review the algorithmic applications created by the municipality?

9. Has the municipality acquired advice on the implementation of algorithms from an independent organisation? If so, what organisation was this? Has this organisation also evaluated whether the algorithm conforms to the demands of the General Data Protection Regulation and the General Law of Equal Treatment?

10. Is the Data Protection Officer considering other ethical aspects besides privacy, such as equal treatment and transparency? If so, how are these aspects safeguarded and who is responsible for it? Is the municipality prepared to assign a separate officer to this task.

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Colophon

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Increasingly it is not humans but algorithms – digital decision formulas – that determine how people are treated by the government. In this essay, Laura de Vries, researcher at the Mr. Hans van Mierlo Foundation, will investigate how local government use algorithms, and the risks this poses to liberal values such as equal opportunity, freedom and rule of law.

“Algorithms can contribute to the increase of existing inequality and the limitation of individual freedom. There is another way. If algorithms are developed and used with respect for fundamental rights and freedoms, there is an opportunity to promote the freedom and the emancipation of individuals.”

- Laura de Vries


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