Value Sensitive Design:

Case study in AH 

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***Main Objective***

Study how to apply Value Sensitive Design in an recommender system for Albert Heijn

# Introduction

Value sensitive design (VSD) represents a pioneering endeavor to proactively consider human values throughout the process of technology design[5]. The work is grounded by the belief that the products that we engage with strongly influence our lived experience and, in turn, our abilities to meet our aspirations.

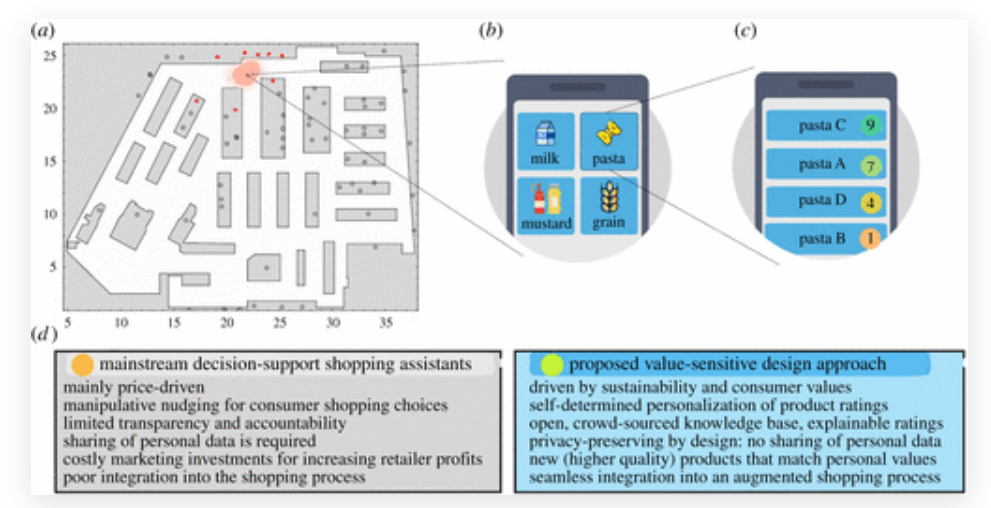
In a so-called diverse world, values has difference importance by each user/stakeholder. Adding, the expanding spectrum of product choices and their production complexity challenge consumers to make informed and value-sensitive decisions. Recent approaches based on (personalized) psychological manipulation are often intransparent, potentially privacy-invasive and inconsistent with (informational) self-determination[1]. By contrast, responsible consumption based on informed choices currently requires reasoning to an extent that tends to overwhelm human cognitive capacity.

Many different stakeholders can use or affect a recommender system. These stakeholder have different values and desired outcomes, so how to connect and address all this in a single recommender system? In the next chapters this work will apply a Value Sensitive Design for a recommender system in Albert Heijn.

# Theorical Framework

People are different, so the one fits all doesn’t work for a recommender system based on that each person (or in our example here a stakeholder) has different values and motivation. One example is presented in [1], were they compare mainstream decision support x value-sensitive design. The example in figure1 is VSD based on sustainability and customer values as main values.

One of the biggest issues with mainstream recommender (p.e price-driven approach) is limited **transparency** and **accountability**. So, who are receiving the suggestion, in this case the customer, don`t know why he is receiving and probability who are sending either.



**Figure1**. Comparison between maistrem decision-support x value-sensitive design, adapted from [1]

Another important discussion, was started with Friedman and Nissenbau(1996), they had already pioneered an analysis of **bias** in computer systems, arguing that such systems are biased if they "*systematically and unfairly discriminate against certain individuals or groups of individuals in favor of others [by denying] an opportunity for a good or [assigning] an undesirable outcome to an individual or groups of individuals on grounds that are unreasonable or inappropriate*" [3]

A good understanding of **biases** would allow us to identify potential harms in a system and either avoid them in the process of design or correct them if the system is already in use. To this end, Friedman and Nissenbaum provided a taxonomy of biases that remains highly relevant and useful for today's debate on algorithmic bias and discrimination (see, e.g., Dobbe et al., 2019; Cramer et al., 2018). Based on the respective origin of bias, they specified three different types of biases, namely *preexisting bias*, *technical* *bias*, and *emergent* *bias*.

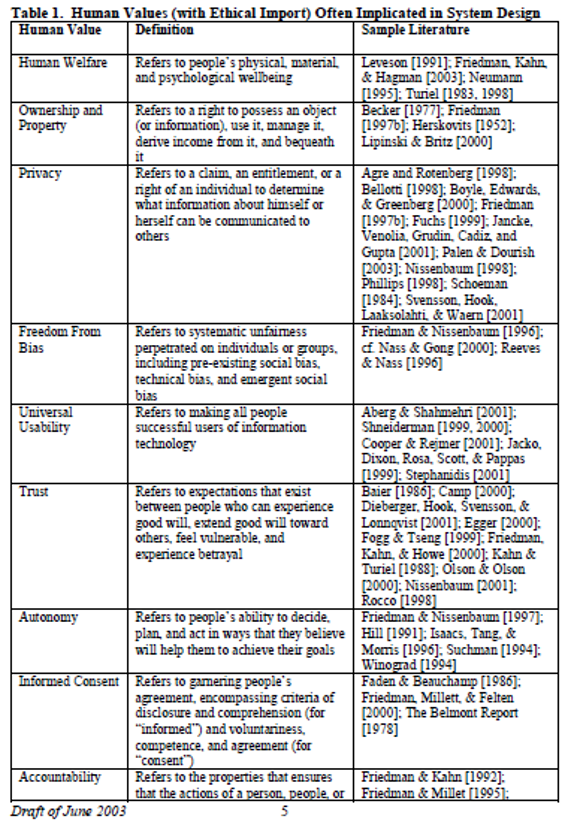
**Preexisting bias** has its roots in social institutions, practices, and attitudes and usually exists prior to the creation of the system[3]. It can either originate from individuals who have significant input into the design of the system (**individual preexisting bias**) or from prejudices that exist in society or culture at large (societal preexisting bias). **Technical bias** [3], in turn, arises from technical constraints or considerations. Sources of technical bias may include limitations of computer tools (e.g., in terms of hardware, software, or peripherals), the use of algorithms that have been developed for a different context, and the unwarranted formalisation of human constructs, that is, the attempt to quantify the qualitative and discretise the continuous. **Emergent bias is bias** [3] that arises in a context of use, typically some time after a design is completed, as a result of (a) new societal knowledge or changing cultural values that are not or cannot be incorporated into the system design or (b) a mismatch between the users—their expertise and values—assumed in the system design and the actual population using the system.

# Methods

As defined in [3] Value Sensitive Design as a theoretically grounded methodology emerged against the backdrop of the 1990s rapid computerisation and as a response to a perceived need for a design approach that would account for human values and social context throughout the design process. Indeed, Friedman's (1997) seminal edited book Human Values and the Design of Computer Technology already provided an impressive demonstration on how to conceptualise and address issues around agency, privacy, and bias in computer systems, emphasising the need to "embrace value-sensitive design as part of the culture of computer science".

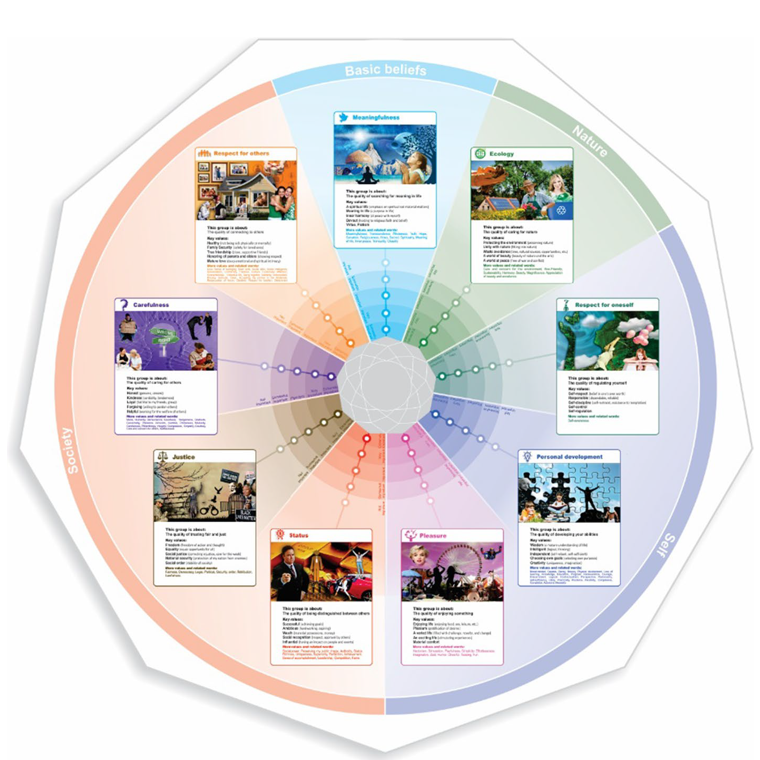
At its core, the VSD approach offers a concrete methodology for how to intentionally embed desired values into new technologies. It consists of three iterative phases, namely conceptual-philosophical, empirical, and technical investigations, sometimes called **TRIPART** methodology:

* **Conceptual investigations** aim at (theoretical) conceptualizing the various values and value tensions
* **Empirical investigations** aim at understanding the users’ attitudes, desires, opinions, and values.
* **Technical investigations** concern identifying value issues based on existing technical designs and translating these values into technical features.

Friedman defined a list of values as she called “Ignition list” see table 1. Kheirandish**,** see figure2,continue these definitions but in a framework that a team has the opportunity to discuss about many different stakeholders, values and tensions, and using cards put on “plot” to have a full picture of the product and the values discussed. The **heterogeneity** of the team is a important part of the project to avoid mentioned bias, with many different background people have better insights and discussion on how to make the system taking in account as many as possible different human values.

Stakeholders are an important aspect of the VSD and it can be **direct** (p.e customers) or **indirect** (p.e society), **human** or **non-human** (p.e technology / computer / app). The steps to define stakeholders are: 1) visualize all stakeholders, 2) categorize into group/clusters (if needed) 3) list key characteristics.

In this work it will be used **conceptual investigation** of values, defined in HuLu [2] (see figure2), **empirical** defined by the author and other students, it simulate users as *personas* to exemplify the **conceptual** values. These 2 aspects will be incorporated in a recommender system develop under an APP to illustrate the **technical** **investigation.**



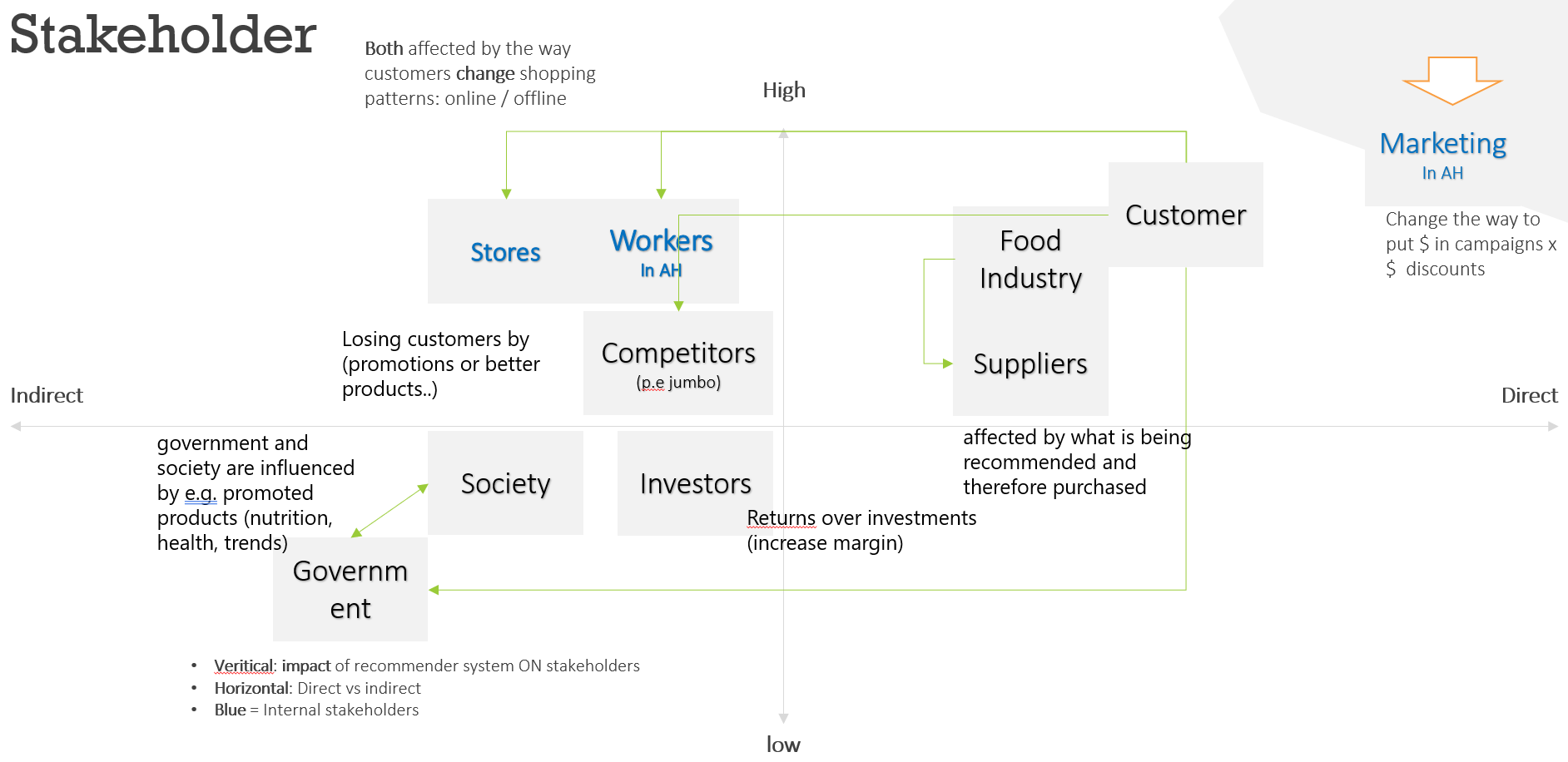
**Figure2**. Hu Value Tool, adapted from Kheirandish

The domain that these investigations were study is an Albert Hein (AH) app recommender system. The app, users, AH’s employees and Netherland community are appropriate to show all the methods describe above, taking in account different stakeholders, values and tensions of this complex environment, for example users preferences for prices or sustainability (p.e bioproducts), AH`s profits x product diversity (p.e + margin and - stock vs - margin and + stock).

# Results

The first step on the development of a recommender system for AH, was mapping all possible stakeholders to later select some key stakeholders. In [4] there is list of many different stakeholders by domain, so it was chosen as retailer domain. The full list of stakeholders can be found on the website.

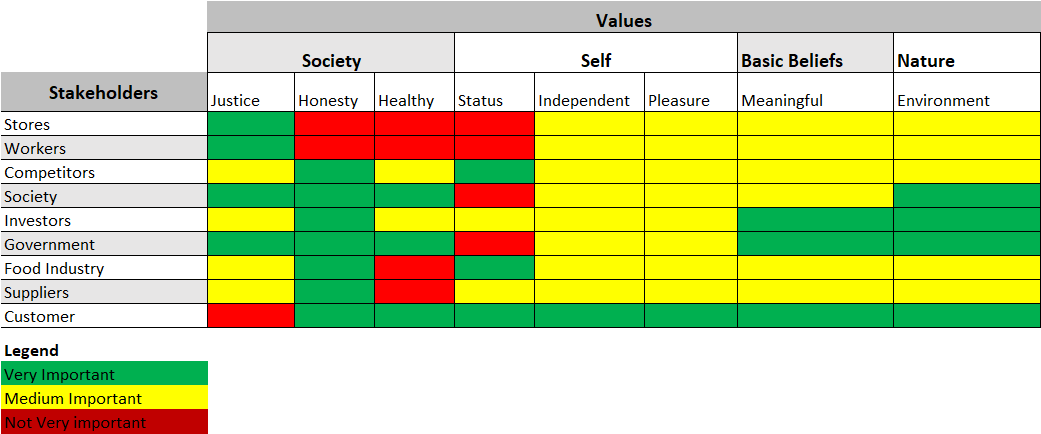
Next step was to group stakeholders and mapping key characteristics of these stakeholders. For simplicity, the stakeholders were grouped in **Internal** (stores, workers and marketing) and **external**( Customer, food industry, suppliers, competitors, society, investors, government). As one can see on figure3, the direct and indirect impact is divided by vertical axis (p.e society is indirect and customer is directed impacted). This representation on a plot with arrows showing interaction between nodes (stakeholders) and from/to (direction of the arrow) can illustrate the initial insights of tension or conflict between different ways of your recommender system.



**Figure3**. Summary of stakeholder used on the analysis and initial interaction between then.

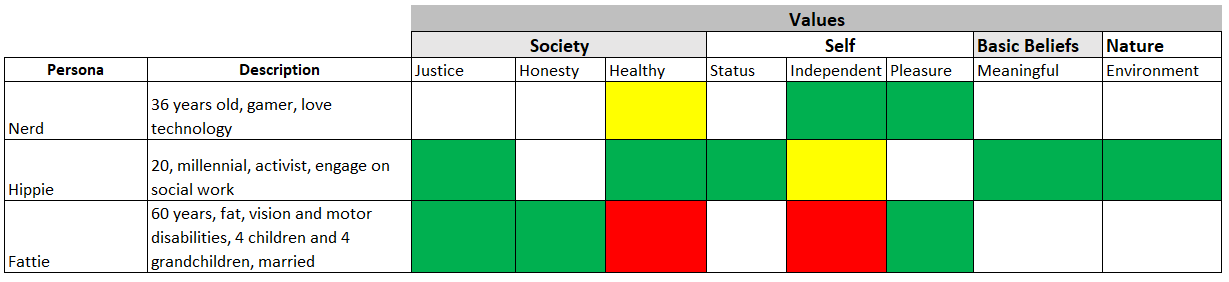
It became clear that one single recommender system without taking into account different stakeholders will lead to a bad system, with poor suggestion, biasing the system or losing accuracy. As an example an algorithm that focus only on selling more, it will show to all customers only promotions, but may not consider that a supplier can`t produces that enough quantity or even worst, try to sell things to a customer who don’t ***want to*** buy that item. The last part of this statement bring the work to next step: define human values inside the recommender system.

The HuValue [2] framework define a list of human values to address this part. The list of values used in this work is described in table 2. In this work, for simplicity the graduated of impact were 3 important levels only: very, medium and not very important. A red color doesn’t mean it is bad (p.e a customer with “red” on justice), but only that value is not very important.



**Table2**. Relation between values and stakeholders

Customer is a very vague definition, if one taking in account all customers the same way (P.e averaging customers), we will have the same problem as before, so one fits all is not a good idea in a recommender system. This necessity brings to another part of the work, cluster customers as personas to model different interpretation of values. To illustrate that it was created 3 personas with very different values and personalities:



**Table3**. Relation between values and personas (sub group of customers)

These definitions we created in a group work, so different opinions were taken in account, for instance, different people backgrounds, lifestyle and interested. In a different scenarios (no covid for example) the ideal procedure would be interviews with each of these stakeholders to proper define his own values. A way to minimize the biased was using different people opinion as mention as group heterogeneity.

The last stage is to pop this personas as a cards, and plot on HuValue framework to a full view and see balance and tensions of your desired recommender system, see figure 3. Each card is a composition of **persona** AND **value.** For instance Nerd & independent, plotted in Self, as independent is a value that belongs to this “main group” of values. The colors in postcards is intended to easily differentiate the personas visually.



**Figure3**. HuValeu framework with personas and key values by persona.

After the “*value wheel*” been filled it became more clear that the system has tension and need balance on the value-forces. As a example in one side Hippe and his lifestyle of environment activity and healthy diet, demands a range of products with engagement, like bioproducts or from local community. On the other side of the food chain we see Nerd and Fattie with a demand for pleasure, in that case junkie and cheap food, so que question arise: How to balance the recommend and address both groups properly? With a recommender system based on values. Therefore, Nerd will receive a range of products, but Fattie and Gamer a very different range. The stakeholders like investor that were interested in profit but in image as well have their needs fulfilled, as probably the AH will increase their selling numbers through more accurate suggestion.

The system need the users inputs continuously (p.e buying trends), to measure accuracy of the recommendation. All customers personas have their values satisfied and will continue improving the recommender system, so is a cycle where users provide feedback to recommender and it provides better suggestion to users.

# Conclusion

As discussed in this work, value sensitive design is a novel approach that aims to address tension from different values and stakeholders in a system. The main advantage is to balance this tension forces in a way to handle multiple perspective as an individual (p.e individual values) but aiming at a global level (p.e increase profit of AH and user satisfaction at same time).

Proper utilization of VSD could support such efforts as the method not only requires diligent investigations of the values at stake (see, in par­ticular, the philosophical and technical investigations in the VSD method), but also calls for the involvement of interdisciplinary research teams that include, for ex­ample, philosophers, social scientists, or legal scholars. Of course, such interdisci­plinary approaches can be challenging and resource intensive, but ethical design ultimately demands more than mechanical, recipe-based treatments of FAT re­quirements [3]. Striving for truly *value-sensitive* designs im­plies being sensitive to the manifold meanings of values in different societal and cultural contexts and requires recognizing, relating, and applying different discipli­nary competences[3].

# References

[1] [Thomas Asikis](https://royalsocietypublishing.org/doi/10.1098/rsos.201418), [Johannes Klinglmayr](https://royalsocietypublishing.org/doi/10.1098/rsos.201418), [Dirk Helbing](https://royalsocietypublishing.org/doi/10.1098/rsos.201418)  and [Evangelos Pournaras](https://royalsocietypublishing.org/doi/10.1098/rsos.201418) (2021). *How value-sensitive design can empower sustainable consumption*. [**https://doi.org/10.1098/rsos.201418**](https://doi.org/10.1098/rsos.201418)

[2] Shadi Kheirandish, Mathias Funk, Stephan Wensveen, Maarten Verkerk,Matthias Rauterberg1 (2019). *HuValue: a tool to support design students in considering human values in their design.* International Journal of Technology and Design Education (2020) 30:1015–1041 <https://doi.org/10.1007/s10798-019-09527-3>

[3] Simon Judith,Wong Pak-Hang, Rieder Gernot(2019). *Algorithmic bias and the Value Sensitive Design approach*  DOI: https://doi.org/10.14763/2020.4.1534

[4] Stakeholder map: <https://www.stakeholdermap.com/retail-stakeholders.html>

[5] Janet Davis, Lisa P. Nathan (2014). *Value Sensitive Design: Applications, Adaptations, and Critiques*

*[6]* Cramer, H., Garcia-Gathright, J., Springer, A., & Reddy, S. (2018). *Assessing and Addressing Algorithmic Bias in Practice*. Interactions, *25*(6), 58–63. <https://doi.org/10.1145/3278156>

[7] Dobbe, R., Dean, S., Gilbert, T., & Kohli, N. (2018). *A Broader View on Bias in Automated Decision-Making: Reflecting on Epistemology and Dynamics*. 2018 Workshop on Fairness, Accountability and Transparency in Machine Learning. <http://arxiv.org/abs/1807.00553>