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Master Thesis in Social Data Science

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When Faces become Data:

Media Framing of Facial Recognition Technology in Danish News Articles

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Abstract

News media articles continue to be a primary source of information, influencing public perceptions, attitudes and opinions. Grounded in frame- and agenda-setting theory, this thesis investigates how Danish news media articles have framed the AI-technology of facial recognition from 2014 to 2024. Using a mixed methodology, qualitative frame analysis was conducted to identify frames in a subset of articles. These frames were then extrapolated to a dataset of 2,681 articles from 14 Danish news outlets using machine learning methods. The analysis identified five overarching frames pertaining to crime prevention, privacy concerns (represented by two frames with different degrees of alarm), technological advancements, and bias and discrimination. Aggregated over the decade, the analysis found more positive frames to dominate the discourse in FRT coverage. However, it concurrently observed a high frequency of frames related to privacy concerns. Various trends in frame usage were observed throughout the decade, pointing towards a potential normalization process happening within recent years. Finally, the coverage was found to subtly differentiate by outlet partisanship. Findings add to the field by investigating media framing within a national setting that contrasts with previous literature, and hope to inspire more constructive discussions of FRT and its implementation into society.

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1. Introduction

Facial recognition technology (henceforth referred to as FRT) is a type of AI-enabled biometric technology, capable of identifying human faces from an image or video - in other words, 'recognize' a face. The path to recognition involves the algorithm looking for the basic characteristics that constitute a face - the eyes, nose, mouth, etc., - placed within certain proximity to each other and conduct what is called a biometric analysis (Dataetisk råd, 2022). Such analysis generates a 'face print', a mathematical model representing an individual's unique face.

Since its inception in the 1960s, FRT has remained relatively limited in the global public consciousness (Naker, Sharon, & Greenbaum, 2017). However, as the field has grown in tandem with great advances in deep learning technology, it has received more media attention in recent years (Shore, 2022), and as its accuracy continues to improve (Grother et. al., 2024), its range of applications widens, making it popular across both private and public sectors all over the world: From everyday use by millions of people to unlock their smartphones (BusinessWire, 2022) to aiding governments in detecting individuals with fevers during a world pandemic (Van Natta et al., 2020).

However, alongside the possibilities it enables, others point to its risks; research demonstrates how biases in the real world leak into AI-domains - for example, when FRT accuracy is high as long as the face recognised is one of a white man, while dropping drastically for people of colour or other gender identities, leading to concerns about racial discrimination and potential marginalization (Lohr, 2022; Perkowitz, 2021). Others call attention to how the technology could add a whole new dimension to possible violations of privacy, civil liberties and basic human rights (Naker, Sharon, & Greenbaum, 2017).

General understanding of the technology additionally remains limited, as population surveys show that many struggle to understand the difference between regular camera surveillance and FRT (ADD, 2021; ADA, 2021), including the benefits and risks it thus poses. Added to this is the influence of historical media depictions of AI (Goode, 2018), leading to science-fiction- and fear-based narratives quickly being evoked in the debate of FRT (Eireiner, 2020), which may further complicate the understanding of the technology.

This combination of a relatively pronounced lack of technological literacy, historical priming of AI, and different technological implications, presents a rather complex media environment where constructive and balanced discussions of FRT might be challenging.

Besides the media coverage brought from the reasons outlined above, FRT is rigorously discussed in relation to various criminal controversies happening all over Europe, where governments are increasingly looking to FRT as a potential solution for identifying perpetrators and improve public safety (Hilliard, 2023; The Economist, 2024; BBC, 2023). In Denmark, the country's challenges with gang related crimes led to the government agreeing to allow law enforcement to use FRT in severe criminal cases, on September 5th, 2024 (Justitsministeriet, 2024) - a decision that created extensive media coverage.

Such coverage and surrounding circumstances call for an investigation into how the Danish news media frames FRT to its readers. The media are namely not objective disseminators of factual information, as posited by frame- and agenda-setting theory, but instead present issues according to certain perspectives and understandings of reality (Nguyen & Hekman, 2022). Building on these theorizations, research has consistently shown that the way in which the media frame and depict issues in their coverage directly influence public opinion and understanding (Entmann, 1993; Scheufele & Lewenstein, 2005; Shore, 2022). This, in turn, may influence policy agendas (Gilardi et al., 2024). Considering the already challenging obstacles in discussing the technology, news media portrayals leading up to and following the Danish government's recent decision may thus be particularly important, potentially able to either clarify or obscure the public's perceptions of the technology. The paper contends that if the media, for instance, consistently portrays FRT in a biased or imbalanced manner, it could influence public perceptions in ways that hinder an understanding of the technology in its entirety, including the risks and benefits it poses. Extendedly, this could contribute to a greater acceptance or stronger opposition for its implementation - both scenarios of which have implications for society (Eireiner, 2020). By identifying how Danish news media articles frame the technology to its readers, it may bring attention to such potential framing imbalances or media attentions. Even though this study does not prevent these from existing, the paper contends that identifying them is, at least, a first step in making them visible and incentivizing more nuanced and constructive, public discussions about FRT in the future (Gilardi et al., 2024).

Grounded in frame- and agenda-setting theory and using a mixed-methodology, this paper analyses FRT portrayals in Danish news media articles by 1) identifying employed frames and investigating their dominance, 2) exploring their prominence diachronically over a decade and 3) investigate if the coverage of FRT is differentiated by media partisanship. In the following chapters, the theoretical framework is outlined, followed by a review of existing literature and a discussion of why the case of a Danish perspective is interesting in this regard. Then, the methodology is outlined, before the analysis results are presented. The thesis ends with a discussion of these results and a section on its limitations, before reaching its conclusion.

2. Theoretical Framework: Frame- and agenda-setting theory

It is broadly recognized that the media possess powerful influence and persuasion in matters of public opinion, belief and perception of reality, able to attract and direct public attention (Marais & Linström, 2012; McQuail, 1994). Although the media and its sources of information has spread so diverse that the primary contributor to public understanding is no longer confined to conventional mass media, news media articles continue to be powerful in reaching the public and informing on political, social and cultural matters (Nguyen & Hekman, 2022; Ørsten & Eberholst, 2023). However, news media are not objective observers nor neutral communicators in disseminating information; media presents and portrays according to a perspective and understanding of reality (Nguyen & Hekman, 2022). Frame theory builds upon this conviction.

While the general conceptualization of "framing" is largely based on Goffman's (1974) notion of framing as a process that influences sensemaking and creates "schematas of interpretation", it was not until Entmann (1993) applied it in analyzing content of mass media that it came into being a widely recognized methodology and theoretical underpinning in this domain (Marais & Linström, 2012). Since then, the theory has been used to understand media portrayals in connection with a wide range of topics, from nanotechnology (Scheufele and Lewenstein, 2005) to the European migration crisis (Klein & Amis, 2021) to AI and FRT, as will be outlined in the following chapter. As such, it presents a framework for understanding how communicators, such as the media, presents a given issue to its readers - i.e., which "strip of the everyday world" they choose to employ in their portrayal (Goffman 1974: 10-11) - and how this affects the way audiences interpret information, develop schemas and understand reality (Marais & Linström, 2012).

How, then, are frames to be understood? Sheufele (1999) calls attention to the vagueness that surrounds the concept, having previously resulted in slight conceptual inconsistencies in studies applying the framework. Given that there exists no widely accepted definition of framing (Marais & Lindström, 2012), expanding on how it is operationalized in the current study becomes particularly important. Drawing on definitions of previous literature, a frame is to be interpreted as a way in which people make sense of the world through the organization and selection of certain aspects of it over others (Sheufele, 1999; Entman, 1993). As the media itself is part of this reality, it both influences how society understands those events as well as reflecting a specific part of it. Even though these explanations provide a baseline for its

definition, this paper finds that frames are best understood through the analogy by Gaye Tuchman (Marais & Linström, 2012, 23):

> *News is a window on the world, and through its frame, Americans learn of themselves and others, of their institutions, leaders, and lifestyles, and those of other nations and other peoples. The news aims to tell us what we want to know, need to know, and should know. But, like any frame that delineates a world, a news frame may be problematic. The view through a window depends upon whether the window is large or small, has many panes or few, whether the glass is opaque or clear, whether the window faces a street or a backyard.*

The world is thus made sense of by the "window" through which it is viewed, and depending on the frame of this window, specific cuts of reality are presented. Even though news media articles are just one of many forums (i.e., *windows*) for exploring framing of a given issue, they "*[…] dominate the larger issue culture, both reflecting it and contributing to its creation*" (Gamson and Modigliani, 1989, 3). So, while frame theory is not limited to analysing frames in news media, it is most used in this context (Arowolo, 2017) - as it also is in the current paper.

However, as this study not only seeks to identify the frames in the coverage of FRT in Danish media, but also how pronounced each of these frames are, frame theory is complemented by aspects of agenda-setting theory. Agenda-setting theory is, similarly to frame theory, concerned with the media discourse and its effects on public understanding. However, where frame theory focuses on *how* a given issue is presented, agenda-setting theory focuses on *what* is presented; as McCombs and Shaw (1972, 177) explained in their formulation of the theory, "*media force the public's attention to certain issues, events and/or people, [... prompting] what the public should think about, know about, have feelings about*" - as the name suggests, it sets the agenda. As such, agenda-setting explores which issues the media consider important over others by giving these prominence and coverage in terms of frequency, making them more present in the public consciousness (Marais & Linström, 2012), rather than investigating the nuances or frames within an issue in the media.

The two theories are commonly applied in combination to get an extensive understanding of the media and its framing effects, with certain scholars even suggesting that they are not only related, but that framing is the second level of agenda setting (Scheufele, 1999; Marais &

Linström, 2012). In exploring media coverage of FRT in Denmark, this paper will primarily draw on frame theory, however, complement it with aspects of agenda-setting theory:

Frame theory, constituting the foundation of the methodological approach, is employed in identifying frames in the Danish news media coverage of FRT, with the theoretical assumption that this ultimately influences audiences' understanding of the technology.

Since the "issue" in this paper is limited to the topic of FRT, agenda-setting theory is applied in the exploration of how *often* a particular *frame* appears. As such, the theory would point to which frames dominate the media coverage through frequency and thus, determine which aspects of the debate that are prioritized by the media to be given coverage.

3. Literature review

The way issues, events or circumstances have been presented in the media have historically influenced our collective understanding of them (Marais & Lindström, 2012; McQuail, 1994) - which is no less true in cases of technological advancements. The public has always been sceptical when faced with emergent technologies (Tistarelli & Grosso, 2010), however, research has shown how early perceptions of new technology are heavily influenced by the framing in news media coverage: from the internet (Rössler, 2001) to nanotechnology (Scheufele and Lewenstein, 2005) to Twitter (Arceneaux & Weiss, 2010), these were all initially framed positively when novel, shaping overall public sentiment, perception and acceptance by the public. In their study, Scheufele and Lewenstein (2005) even finds how media framing has a direct impact on public opinion, even when people have more factual knowledge of the technology, demonstrating how increased domain-knowledge still does not weaken the influence of media framing. It is thus evident just how much influential power, news media and framing hold in shaping public debate and determining attitude when presented with new technologies and scientific innovation.

FRT is, for now, still a technology in its early stages of deployment and societal integration, making research into its framing particularly relevant at this time. Correspondingly, this also means that research specifically on framing of FRT remains relatively limited. As not to rely solely upon a limited body of literature in understanding the field and formulating the research questions, the current study will first examine the wider context in which FRT is positioned within by briefly reviewing existing literature on framing effects related to its broader category, AI. Following this, research on framing related specifically to FRT is examined and finally, the socio-political situation in which the Danish news media outlets operate is outlined, pointing to why the study of framing of FRT is relevant in the case of Denmark.

3.1. AI and the media

Given that FRT is a form of AI (Shore, 2022), examining how AI historically has been framed in the media becomes relevant as a way of contextualizing our understanding of framing effects of FRT. AI is likely the technology having experienced the greatest advancements the past years and thus received much media attention (Nguyen & Hekman, 2022). It is, however, not a topic completely unfamiliar to the media discourse. Influenced by the historical legacy of

science fiction narratives and being an ambiguous technology, difficult to comprehend without a technical background, AI has been presented through various lenses, with depictions as anthropomorphic robots, sentient systems or narratives of machine uprisings having remained prevalent in popular media since the early 20th century (Goode, 2018). Looking specifically at news media coverage, AI's ubiquity first really emerged in the mid-2010's, where it quickly evolved from a niche- to mainstream issue, with the news discourse becoming gradually more and more critical over time (Nguyen & Hekman, 2022).

However, as awareness and understanding of AI presumably will increase in step with its integrations as a convenient tool in our everyday lives, the apocalyptic narrative likely too will change, and many of the previous futuristic science fiction perceptions fade (Goode, 2018). This postulation aligns with the study of Nguyen & Hekman (2022), observing how the AI news framing generally has shifted in the US the past decade from being a concept of science fiction to placing its focus on the more tangible economic, cultural, social, or political impacts of AI. Yet this history of being associated with such dark narratives has undeniably primed audience understandings and expectations of what AI is capable of and which consequences it might bring (Goode, 2018; Shaikh & Moran, 2022). As such, this contextualization should be kept in mind when interpreting and understanding the current narrative of the news media, because as Goode (2018) asserts, when it comes to narratives surrounding AI, science fiction, news media, and futurological discourse are interwoven.

This is evident, for instance, in the research of Sun et al. (2020), which finds that news media historically has drawn on these types of narratives when using lexical compounds like "weaponized AI" or "human AI", presenting AI as a threatening force or a human-like being. Besides reinforcing the historical perceptions of AI and its entailments, such use of linguistic devices in media framing reduces AI's complexities into more tangible and emotionally charged phrases that the public might more easily understand. But in doing so, it completely oversimplifies an intricate and multifaceted technology. The way in which AI is communicated may thus have a big influence, where more critical and clearer reporting contributes to a better conceptual understanding and technological literacy among the public (Nguyen & Hekman, 2022). The media is therefore crucial in matters of discourse and perception, and, as these studies highlight, acts both as an informer but also a translator of technical knowledge to the public (Sun et al., 2020; Nguyen & Hekman, 2022). Gilardi et al. (2024) adds to this point, as they argue that if we are to effectively address the actual impacts of such technology and ensure

a constructive discourse about its risks and potential, understanding media narratives are important. Even though their focus is on the parent category of AI, the paper contends this to be extended to FRT.

3.2. FRT and the media

Unlike AI, which has been a topic of media discussion for years (Sun et al, 2020), FRT has only recently become of a quality that makes more widespread deployment possible, resulting in it only becoming a topic of societal debate and research within the past years (Shore, 2022). However, research within the field is growing. Literature substantiating frame theory's conceptualizations when applied to FRT include the study of Shore (2022). In conducting a 2x2 mixed factorial experiment, it observed how framing FRT directly influenced participants' attitudes towards the technology: When framed in broader societal contexts, support for prohibitive policies was high. When, on the other hand, framed in relation to specific cases or events, concerns of privacy were prominent. FRT is thus no exception and, like many topics analysed before it, cannot escape the power of framing.

In investigating how this technology then is portrayed in news media, Eireiner (2020) conducted a discourse analysis of media coverage published based on a pilot run of algorithmic surveillance at Berlin-Südkreuz train station, finding that surveillance technologies, including FRT, are often referenced using adjectives such as 'relentless', 'weapon-grade' and 'totalitarian', framing it as a *threat* (Eireiner, 2020, 8). Furthermore, personifications were frequently used, referencing how models 'learn', that the technology is a 'they' - constructing a 'us' and 'them' narrative-, and portraying algorithmic surveillance as an ominous and autonomous entity. As such, these findings draw parallels to the fear-based discourses historically surrounding AI, with FRT seemingly having inherited a similar sombre framing. However, distinct from AI, Eireiner (2020) observes narratives with references to Franz Kafka or George Orwell, framing the technology as a form of "*algorithmic surveillance to exercise totalitarian control*" (Ereiner, 2020, 10).

Shaikh & Moran (2022) adds to this observation as they similarly identify prevalent frames distinguishable from the framing of AI in their study of news media framing of FRT in the US, such as bias and discrimination, and privacy and surveillance. However, they also find that such framing of news media coverage greatly depends on outlet partisanship; media outlets

with agendas of their own, which reflect their ideological stances, political affiliations, or economic interests, are pushed through the use of frames (Shaikh & Moran (2022). From their research, we can thus infer that external factors, such as partisan leaning of news media outlets, contribute to a varied communicative environment. Factors like country-, cultural- or national specific circumstances might then too influence the discourses surrounding FRT. Although these studies show that the framing of FRT is distinguishable from its broader AI umbrella, it often retains the dark portrayals associated with AI. However, might this narrative shift in a Danish context, where specific social and political circumstances - such as ongoing gang violence - potentially lead to different frames? The following section explores this thought.

3.3. Framing of FRT in the case of Denmark

Thus far, previous research has given an understanding of framing and its effects in relation to AI and FRT in a global perspective. However, as contemplated towards the end of section 3.2, it is conceivable that external factors and/or certain country specific circumstances could influence the media's framing of the technology. Although the news media debate surrounding FRT in Denmark is likely to reflect the same socio ethical dilemma as seen in previous studies (that is, the balance between improving security and protecting privacy), what may differentiate itself in the Danish case is the frames predominantly used in this debate. Despite studies such as Shaikh & Moran (2022) and Eireiner (2020) finding similar narratives surrounding FRT, which are different from those of AI, the framing practices remain characterized by a critical tone reminiscent of the historical framing of AI, even though the studies were conducted in different countries. However, the Danish government's decision to allow law enforcement to use FRT for crime prevention purposes was directly motivated by societal challenges of gang violence (Ritzau, 2024). This draws attention to whether such year-long challenges could yield news media frames that differ from those recognized in previous studies. Might the portrayals instead emphasize the advantages of the technology rather than the risks, differentiating it from the critical frames seen internationally?

Denmark is additionally a country with a high trust in the government (OECDa, 2024), which stands in contrast to the reviewed studies investigating framings in the US and Germany (e.g., Shore, 2020; Shaikh & Moran, 2022; Eireiner, 2020) - countries which exhibit lower levels of trust in their government (Statista, 2024; OECDb, 2024). Such difference may be important, as

the paper contends that the general perception and attitude towards FRT likely depend on whether citizens believe that its deployment in society will be conducted responsibly by the government and police.

Studying how Danish news media frames FRT may thus add to the field by investigating if the framing remains similar across borders regardless of various country-specific and sociopolitical circumstances.

4. Research question

Even though previous research has explored media narratives and framing of FRT in different national settings, there is a gap in literature regarding its coverage in a country like Denmark, which has circumstances that contrasts with those previously investigated. In approaching this gap, the paper will build on studies within the field of frame- and agenda-setting theory and FRT but differentiate itself by analysing coverage of FRT in Danish news media. Seeing how various frames and narratives hold power in influencing opinion (e.g., Shore, 2022) and that media outlets sets the agenda through their employment of them (e.g., Nguyen & Hekman, 2022), the first research question seeks to get an understanding of the frames used in FRT coverage. In doing so, it is further motivated by the postulations made by Gilardi et al. (2024), though extended to FRT, as they argue that achieving this is necessary to ensure a constructive and balanced discourse about the risks and potentials of the technology. Adopting an approach that takes inspiration research such as Shaikh & Moran (2022) and Sun et al. (2020), the paper asks the first research question:

> *RQ1: What frames are employed in the coverage of FRT within Danish news media articles and which dominate the discourse?*

The study of Klein & Amis (2021) shows how framing of an issue can change quickly, wherein great changes in frame prominence or even composition can occur over time. In drawing inspiration from their findings and investigating the media framing of FRT diachronically, the paper asks:

> *RQ2: How has the framing of FRT evolved over time and is it changing with policy developments or external events?*

As Shaikh & Moran (2022) finds that framing can depend on the partisanship of media outlets, the paper suspects that this may similarly be the case in the current study. Linking framing to partisanship, the following question is formulated:

> *RQ3: How does the coverage of FRT differ according to the partisan leaning of the news outlets?*

The remainder of this paper seek to answer these questions.

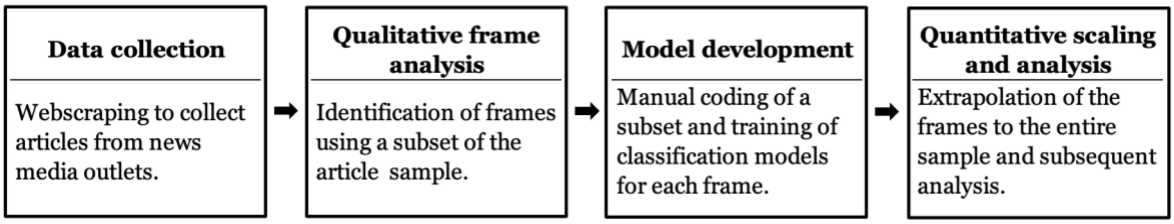
5. Methodology

The following chapter is divided into four sections: 5.1 presents the research philosophy and design, 5.2 elaborates on the data collection process, 5.3 outlines the data cleaning steps and finally, 5.4 goes into the analytical strategy. The latter is further divided into two parts: section 5.4.1 outlines the methodology for the frame analysis for identifying frames in news media coverage, and 5.4.2 presents the methods utilized in extrapolating the identified frames from the qualitative frame analysis to the entire dataset.

5.1. Research philosophy and design

Given the research questions' central role to the study, the chosen philosophy and approach is based on its ability to answer these. As such, the epistemological underpinning subscribes to a constructivist stance, grounded in the very foundation of frame- and agenda-setting theory, theorizing that the construction of reality for news media audiences are influenced by the frames used to present information in articles (Goffman, 1974). The employed research design is thus exploratory in nature aiming to *understand* the topic under investigation and capture the frame patterns surrounding FRT in news media articles.

Figure 1: Research design



Note: The figure shows an overview of research design using a mixed methodology.

Leveraging both qualitative and computational methods in approaching the research questions, the study adopts an exploratory sequential mixed-methods research design: In identifying frame patterns in news media coverage, qualitative close-reading methods were employed inductively on a subset of news media articles; In extending these frames onto the larger sample of articles, machine learning methods were utilized. In combining these methods, the paper places itself in the hybrid of social science and data science, conducting digital-age research through a social data science approach (Salganik, 2018).

5.2 Data collection

The data collection process consisted of various steps, outlined in four sections in the following.

5.2.1 Selection of media

Informed by the research question and previous studies, this paper focuses on legacy media outlets in the form of digital newspaper articles. This decision is guided not only by framing- and agenda-setting theory's extensive application to such forums but also the ability of newspapers in both reflecting and contributing to public discourse and understanding of a given issue, topic or phenomena. The dataset is thus considered observational data (Salganik, 2018).

5.2.2 Time frame

The collected articles span over a period from 01/01/2014 until present time of writing, October 2024. As previously outlined, FRT has only really gained media attention in the past 10 years (Shore, 2022), and a longer period allows for analysing the coverage of the technology over time.

5.2.3 Media outlets selection and permission process

With the media type and timeframe decided upon, the specific news outlets to be included in the study could be determined. However, as the law of the Copyright Act prevented the direct extraction of articles from media outlets' websites, outlets for data collection had to be selected based on a permission process. For this, 15 outlets were contacted to request for written permission to use their articles for the purposes of this research. Of these, 13 outlets granted their permission while two never replied (Appendix1). One of the non-responding outlets, TV2, has its articles publicly available; after consultation with the law firm DLA Piper, they advised that the use of publicly available articles for a study such as this fall under the exceptions in § 11c and/or § 13 of the Copyright Act concerning research and teaching purposes. However, as these exceptions are relatively recent additions to the law, and this situation is not explicitly addressed in the DSM directive, underlying the paragraphs in the Copyright Act, it remains somewhat legally questionable, as pointed out by UBVA (Appendix2). Therefore, based on the legal guidance of DLA Piper and in consideration of this uncertainty, the study continues by including TV2 articles. However, out of respect for TV2's copyright, these articles will not be publicly distributed or reproduced in this paper, with only brief citations included where it is necessary for analytical purposes.

Having been given permission to collect articles, the research adheres to the ethical principles as outlined by Salganik (2018), and ensures, to the best of its ability, that the methods employed in obtaining the data is legal in accordance with the Copyright Act. As visible in Table 1, the study collected articles from 14 Danish media outlets over a 10-year period, cf. the arguments outlined in section 5.2.1-5.2.3.

Table 1: Overview of media outlets included in the study

Media outlet	**Weekly reach (latest figure)[1]**	**Media category[2]**	**Partisan leaning[3]**
Berlingske	333,000	National broadsheet	Right-leaning
BT	366,000	Tabloid	Right-leaning
Computerworld	145,000	Specialized publication	Technology-focused, non-political
DR	*	Public service	Neutral
Ekstra Bladet	258,000	Tabloid	Left-leaning
Finans	315,000	Specialized publication	Finance-focused, non-political
Information	165,000	National broadsheet	Left-leaning
Jydske Vestkysten	489,657	Regional paper	Right-leaning
Jyllandsposten	340,000	National broadsheet	Right-leaning
Kristeligt Dagblad	209,000	Regional paper	Right-leaning
Nordjyske	154,000	Regional paper	Centrist
Politiken	492,000	National broadsheet	Left-leaning
Teknologiens Mediehus	180,000	Specialized publication	Technology-focused, non-political
TV2	*	Public service	Neutral

[1] Weekly reach estimates were obtained from various sources: *Berlingske, Information, Kristeligt Dagblad, Nordjyske:* Mediawatch (2023); *BT, Jyllandsposten, Politiken:* JP/Politikens Hus (2024); *Computerworld*: Computerworld (n.d.); *Finans*: Jyllandsposten (2021); *Jydske Vestkysten*: JFM (n.d.); *Teknologiens Mediehus*: Ingeniøren (2024). *Note: Weekly reach for DR and TV2 are excluded because of unavailable data specifically of their digital news articles.
[2] Media categories follow the report provided by Schrøder, Blach-Ørsten & Eberholst (2023).
[3] Partisan leanings are determined based on reports and articles primarily on Danes' perceptions of the outlets' leanings (see Schrøder, Blach-Ørsten & Eberholst, 2023; Pew Research Center, 2018; Kjærgaard, 2019; Søllinge, n.d.; Winther, 2011).

The employed sampling strategy consequently adheres to purposive sampling as media outlets were selected based on the criteria that written permission was obtained and/or the research was not in violation of the Danish copyright laws. Following this approach ensured transparent researcher practice while still achieving a dataset with articles from various different media outlets: including both national and regional newspapers (e.g., DR and Jydske Vestkysten,

respectively), tabloid and broadsheet newspapers (e.g. BT and Berlingske, respectively) as well as various reach of audiences and partisan leaning. Regarding the latter, despite several outlets claiming to officially be politically independent, audiences often perceive these to be leaning to either of the political spectrum. As such, the leanings were determined based on reports, articles and studies on Danes' perceptions of the outlets' leanings, historical positions and political orientations of the readers (Pew Research Center, 2018; Schrøder, Blach-Ørsten & Eberholst, 2023; Kjærgaard, 2019; Søllinge, n.d.; Winther, 2011).

5.2.4. Search term definition and web scraping

Due to the absence of an API or (collective) downloadable database of articles within funding limits of this study, the data had to be collected through each outlet's media archive on its website. Considering the volume, web scraping was identified as the most effective approach. Web scraping refers to the computational method which (semi-)automates the extraction of data from websites using software able to mimic the way in which a person would explore the web (Khder, 2021). The scrapers were built using libraries of *beautifulsoup4* and *Selenium* to ensure proper pagination as well as dynamic handling of javascript-rendered content. The latter was necessary for websites that required simulating user interactions to, for example, input login credentials.

The overall data collection process was conducted as follows:

Using the search functionality on the outlets' websites, the initial broad search term *'ansigtsgenkendelse'* was employed to retrieve article results. However, to get a more comprehensive sample covering a broader scope of the topic, the search terms were iteratively defined and expanded upon by close-reading a small sample of articles extracted using each new term. The final list of search terms is visible in Table 2. Off-topic articles, which might have been scrapped in this regard, were later removed as outlined in section 5.3.

Having identified the search terms, web scraping could begin. For each media outlet, the following actions were broadly taken for each search term: 1) navigating paginated search results or expanding the single-page list to collect all article URLs from a current page; and 2) after collecting the URLs from a page, directly visiting each URL to extract the content of the article. To retrieve this, a subscription fee was paid to access the content behind paywalls.

Table 2: Finalized search terms with english translations

Danish Search Term	English Translation
ansigtsgenkendelse	facial recognition
facial recognition	facial recognition
face recognition	face recognition
ansigtsaftryk	facial imprint
ansigtsscan	face scan
masseovervågning ansigt	mass surveillance face
ansigtskamera	face camera
overvågningssamfund ansigt	surveillance society face
sikkerhedspakke overvågning	security package surveillance
tryghedsskabende kamera	safety-enhancing camera

Note: The table show the search terms used on each outlet's website to retrieve articles and its English translation. Most articles (n=1,948) were however collected using 'ansigtsgenkendelse'.

As such, the final web scrapers involved automatically handling login procedures, accepting cookies, dismissing occasional pop-ups like newsletters or declarations of consent, etc., to extract the data. For each article, the headline, subheader and content was scraped in addition to metadata such as datetime and category. The approach remained somewhat consistent throughout the development of the 14 scrapers, however, each was adapted to be compatible with each media outlet website (see detailed code for each scraper in Appendix3).

5.3 Data cleaning

Depending on the media outlets archive setup and search functionality, the data filtering and cleaning process varied slightly from outlet to outlet. For example, TV2's search functionality limited results to the first 100 articles per search term and often included articles which were irrelevant to the topic (e.g., articles related to sport, leading to removal of all articles having URL starting with *https://sport.tv2.dk*). Berlingske's articles consistently included a short description of the outlet's history at their end, which was removed. Nordjyske's search functionality returned articles containing any subword of the search term (e.g., 'ansigtsgenkendelse' returned results containing the word 'ansigt' or 'genkend', 'kend', etc.), leading to an overwhelming amount of unrelated articles, which had to be removed.

Moreover, articles were scraped multiple times if they were returned under multiple search terms for each media outlet - e.g., the same article could appear as a result using the search term *'ansigtsgenkendelse'* as well as *'ansigtsscan'* if the article employed both words. As such,

duplicate articles were removed. Finally, all scraped articles were filtered through as to only keep those which explicitly contained words associated with FRT and which were published after 2014 (inclusive) (Appendix4).

Datasets for individual outlet were merged into one collective dataframe. The final sample consisted of 2,681 articles, containing the variables *URL*, *search term*, *date*, *content* and *source.*

5.4 Analytical Strategy

As the current study employs a mixed methodology, the following section is divided into two parts: 5.4.1 Frame methodology, and 5.4.2 Classification task, each expanding on their approach.

5.4.1 Frame methodology

As Connolly-Ahern & Broadway (2008: 369) explain, qualitatively approaching frame analysis enables the researcher to notice specific words or metaphors used in a text and identify not only those employed for various frames but also, equally importantly, those which are left out, arguing *"that the words repeated most often in the text may not be the most important"*. As such, obtaining an *understanding* of the discourse and recognizing its frames involves the process of human interpretation and sensemaking. In the following section, the methodological approach of conducting the qualitative frame analysis is outlined cf. the requirements and practices posed by Marais & Linström (2012).

Subset for qualitative frame analysis

As the total dataset consists of more articles than what is feasible to analyse manually considering the time- and funding constraints of the study, the qualitative analysis was conducted on a subset of the collected data. This subset of articles (n=90) was randomly drawn from each outlet in proportion to its weekly number of readers to reflect the relative influence of different outlets in shaping public discourse.

Unit of analysis

The study follows the classic approach used in frame theory (Marais & Lindström, 2012), and selects the entire article as the unit of analysis rather than, for example, the sentence- or paragraph-level. Given articles' often long and elaborate contents, this allows for several frames within one and thus have implications for the methods implemented in later stages of the analysis (see section 5.5.2).

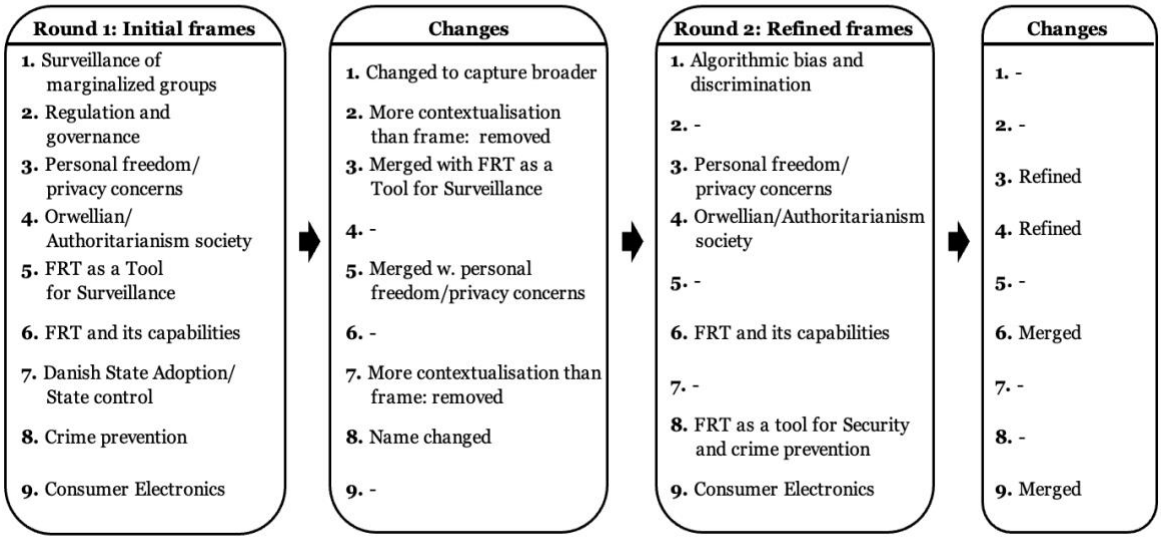
Frame development and inter-rater reliability

The identification of frames was inductively approached in an iterative process of repeatedly defining, refining and adjusting the frames through three rounds (n = 30 articles per round). Notes were taken to ascertain various linguistic and rhetorical devices used, common words or phrases, etc. for articles within each frame (Appendix5). In the first round, 9 frames were identified. However, these were adjusted in both the second and third round: in two instances, one frame was merged into another as it overlapped too much both conceptually and linguistically. Another was adjusted to encompass related frames; capturing portrayals of the technology as a tool for reinforcing structural racism and marginalizing specific groups through surveillance, as well as portrayals of FRT emphasizing its algorithmic bias. Two frames were removed as these were related to a contextualization of the technology rather than constituting actual framings. For example, the 'Danish Political Discourse' frame was initially identified, however, this did to a much higher extent capture articles that only briefly mentioned FRT as a topic within broader political debates, policy decisions or party membership popularity, rather than an actual framing of it, relating the definition of frames back to the theoretical framework. The process of frame identification and definition is outlined in Figure 2, while the finalized frames from round 3 are presented and expanded upon in Chapter 6. The names of these are, however, *Surveillance and Privacy Concerns*, *Orwellian Surveillance*, *FRT as a Tool for Security and Crime Prevention, FRT: the New Standard* and *Algorithmic Bias or Discrimination.*

The final set of identified frames satisfy three of the four criteria for frame development as posed by Marais & Linström (2012, 30): 1) having identifiable and linguistic characters; 2) be commonly observed in journalistic practice; and 3) having characteristics which distinguish the frame reliably from other frames. To satisfy the fourth principle, that frames must be

recognised by multiple researchers, operational definitions were defined as to allow the use of concepts in the same way (Marais & Linström, 2012) (Appendix6).

Figure 2: Frame analysis



Note: The figure shows the frame analysis across 3 rounds. Round1 identified 9 frames. The next rounds adjusted these as additional articles were analysed. If a frame was not changed in a round, it is denoted by a "-". If a frame was adjusted, the change is specified in the "Changes" boxes. The third-round changes lead to the final frames presented in Chapter 6.

Thus, the process of labelling began: the author of this study manually labelled a random subset of 25 articles independently of an additional researcher, which yielded the following Krippendorf's α: *Surveillance and Privacy Concerns* = .74, *Orwellian Surveillance* = 1, *FRT as a Tool for Security and Crime Prevention* = .79, *FRT: the New Standard* = 1, *Algorithmic Bias or Discrimination* = .82. Frames with more apparent and consistent patterns like *Orwellian Surveillance* led to identical coding, whereas frames with more diverse content, such as *Surveillance and privacy concerns* showed more uncertainty (i.e., there is, for example, more way in which the technology can be framed as a cause for privacy concern). However, as all frames' α values lie at an acceptable level, it supports the use of the identified frames in the analyses that follow.

5.4.2. Classification task

As frames were identified in the qualitative analysis, machine learning methods were employed to scale these across the entire dataset. Although computational methods arguably cannot match the quality of human analysis, the volume of the data and scope of the analysis are simply too

great for manual examination. As such, this approach, although acknowledging its limitations, aims to extend the qualitative findings (see section 6.3.1 and 8 for details on its validity and limitations, respectively).

Several classifiers were experimented with in achieving this, however, the simpler classifier of logistic regression showed overall better performance across all five frames, performing separate dichotomous classification tasks for each. Using the same model configuration for all frames, however, did not yield consistently high performance. As such, three separate logistic regression models were developed for each frame: 1) uses only TF-IDF vectorization as predictor, 2) combines TF-IDF vectorization with an added binary frame-specific feature and utilizes a sampling strategy to address class imbalance, and 3) relies only on TF-IDF vectorization but includes a sampling strategy. The following chapter outlines the choices and methods included in training and evaluating these models.

Target Variable and Features

Target: As Hovy (2022) outlines, the label vector constituting the target variable can be referred to as the ground truth; this assumes that it denotes the *correct* label. To attain this variable, 400 articles, separate from those used to develop the frames, were manually labelled based on the frame definitions developed during the qualitative analysis. Each frame was represented by approximately 100 articles labelled as class one.

Feature(s): The models predict the class membership for each frame based on the text content of an article. To transform the text into a numeric, computer-readable format (Hovy, 2022), TF-IDF vectorization was utilized, primarily due to its ability in emphasizing and minimizing words: TF-IDF weights the raw frequency of each word by the number of, in this case, articles which the word occurs in across the entire dataset. In this way, words that occur very frequently across all articles (e.g., stopwords), will get very low scores. Oppositely, words appearing somewhat frequent but only are included in fewer articles overall get higher scores. As observed in the qualitative analysis, the framing of FRT often rely on very specific word use and lexical patterns (e.g., a word such as *'hudfarve'*[1] is likely predictive of a certain frame,

[1] Translated: skin colour.

'frihedskrænkelse'[2] of another, etc.), and by employing this vectorization, such terms are given more weight while very common words are given low weight.

To avoid only relying on individual words and risk losing context, the vectorization was combined with n-grams (ranging from unigrams to trigrams), allowing the identification of frames based on combinations of words (e.g., a phrase such as 'Big brother': 'Big' in itself is not very indicative, 'brother' neither, but together they likely are[3]).

Additionally, a binary frame-specific feature was developed and tested to assess if it improved classifier performance. As prominent words and phrases associated with each frame were identified during the qualitative phase, this feature was added to further improve the classifiers: Labelled as TRUE if an article contained a frame-specific words, and FALSE if otherwise. To prevent data leakage, no articles from the qualitative phase (from which the keywords were derived), were included in the 400 articles used to develop the classification models.

Text preprocessing

All text was converted to lowercase, and special characters removed, except spaces and the Danish characters æ, ø, and å. Stopwords were only lightly removed using SpaCy's Danish NLP stop words library, as testing showed that a more extensive stop words library decreased performance. However, removal of especially frequent words to reduce noise increased performance (see detailed explanation of this in Appendix7). Lemmatization was further applied to transform words to their base form, allowing for different variations of the same word (e.g., singular or plural, various conjugations, etc) to be treated as identical.

Pipeline Overview

To follow a general and streamlined approach throughout the development of the models, a pipeline with a maximum of four components was utilized, depending on the model settings:

Vectorization: Data was transformed into TF-IDF format for all models, using n-grams and max_feature limited to 5000 to reduce risk of overfitting. For models with the added frame-specific feature, TF-IDF vectors were combined with a sparse matrix representing this variable.

SMOTE: Due to the high class imbalance in the labelled dataset, on which the models were developed, different resampling techniques were tested to accommodate the issue.

[2] Translated: violation of freedom.
[3] The example of is a reference to George Orwell's *1984*.

Ultimately, SMOTE oversampling was employed for two of the three models developed for each frame, creating synthetic minority class examples in the training set.

Singular value decomposition (SVD): Enables using a smaller number of dimensions, still able to capture the variation in the data, but which provide fewer possibilities for the model to overfit by exploring spurious patterns (Hovy, 2020). Given the relatively limited datasize, the number of components was determined at a relatively low threshold of 100 to simplify the models' input space, however, still making sure that the most important information from the 5000 features is included.

Logistic regression model: denoting the choice of model. class_weight set to balanced as to increase the weight of minority class examples, mitigating the risk of the model to overfit to the majority class, but pay equal attention to less-presented examples.

Train-validation-test split and cross validation

The labelled dataset was split into training, validation and test set, with an 60%/20%/20% split ratio using stratification to preserve the class distribution. Given the limited minority class examples, splitting further reduced their number in each set, which, as a result, could lead to varying performance depending on the specific split. To approach the risks associated with only few minority class examples in each split, 5-fold cross validation was employed during training to utilize all available data and provide a more thorough evaluation by evaluating performance across multiple subsets of the data, rather than relying on a single split. As such, a cross-validated grid-search was implemented to optimize the hyperparameters.

To further improve performance, threshold optimization was conducted to fine-tune the decision boundary. Thus, thresholds ranging from 0.2 to 0.6 were tested. The one revealing the highest F1 score for the minority class was applied to the test set.

Model evaluation

As the models were developed, the test set was employed to evaluate their performance on unseen data. Optimally, all performance metrics would yield high results with a balanced recall and precision, as the study aims to capture all articles with a specific frame while ensuring that the identified articles genuinely use that frame. However, due to the highly imbalanced distribution of the target variable, the models are biased towards classifying the majority class

and thus, the performance metrics on the overall model creates a false impression of a very good performance. As such, to evaluate the models' generalizability to unseen data, the performance is evaluated separately for each class rather than relying on a single overall metric, as visible in Table 3.

Table 3: Performance Metrics for Each Frame's Classifier by Class

Frame Name	Model Configuration	Optimal Threshold	Class	Precision	Recall	F1-Score	Accuracy
FRT as a Tool for Security and Crime Prevention	TF-IDF (1-3 grams) - Keyword Feature	0.3	Class 0	0.89	0.93	0.91	0.86
			Class 1	0.78	0.67	0.72	
FRT: The New Standard	TF-IDF (1-3 grams) - Keyword Feature	0.3	Class 0	0.95	0.95	0.95	0.93
			Class 1	0.86	0.86	0.86	
Orwellian Surveillance	TF-IDF (1-3 grams) + Keyword Feature	0.5	Class 0	0.97	0.95	0.96	0.94
			Class 1	0.86	0.90	0.88	
Algorithmic Bias and Discrimination	TF-IDF (1-3 grams) + Keyword Feature	0.6	Class 0	0.98	0.85	0.91	0.88
			Class 1	0.69	0.95	0.80	
Surveillance and Privacy Concerns	TF-IDF (1-3 grams) - Keyword Feature	0.2	Class 0	0.89	0.85	0.87	0.81
			Class 1	0.62	0.71	0.67	

Note: Performance metrics are based on the classifiers' performance on the test set. All best-performing models included SMOTE in their pipeline.

As the frames were found in the qualitative analysis to have distinct semantic structures and linguistic patterns pertaining to them, the models similarly needed to capture different patterns, as reflected in the best models for each frame having different settings and features, shown in Table 3. The class imbalance is evident from the low thresholds which led to better performance for three of the five models.

The performance of the minority class is reasonable with a relatively balanced precision/recall across models on the test set, with the lowest performance for the frames *FRT as a tool for security and crime prevention* and *Surveillance and privacy concerns*[4]. Looking back at the Krippendorff α values outlined in section 5.4.1, it becomes visible that frames with a high α score similarly achieve higher model classification performance, and, vice versa, that frames with a lower α score have lower classification performance. It thus points to that frames which

[4] See 6.3.2 for details on validity.

can be applied to more varied content, are to a higher extent more challenging to classify consistently, for human coders and computational methods alike[5].

As the generalization errors between sets for the better-performing models consistently were low between sets, the best model for each frame was re-estimated on the entire labelled dataframe to improve its predictive abilities for classifying out of sample on the unlabelled data.

[5] Detailed in Chapter 8.

6. Results

The following chapter presents the results of the analyses, divided into three main sections. Section 6.1 outlines the descriptive statistics of the entire collected sample of news media articles, before section 6.2 presents the frames identified from the qualitative frame analysis. Section 6.3 focuses on the extrapolation of these frames across the entire article sample and is divided into three parts: 6.3.1 outlines the aggregated frame frequencies, before 6.3.2 presents the diachronic results, showing both the development of published articles over time and the trends in frame usage. Lastly, the results of how FRT is framed according to media partisanship are presented in 6.3.3.

6.1. Descriptive statistics of news media article sample

The final dataset consists of 2,681 articles collected from 14 Danish media outlets from 1 Jan 2014 to 24 Oct 2024. To get an understanding of the descriptive statistics relative to an article population, a general estimation of this was obtained using Infomedia's Media Archive, the largest repository of articles from Danish media[6]. Using the search term 'ansigtsgenkendelse', 10,704 articles were identified from web sources, regional and local newspapers, nationwide newspapers, magazines, news agencies and local weekly newspapers over the specified time period in Denmark (Infomedia, 2024). Considering this paper's sample, in which 2,097 articles explicitly contain the word 'ansigtsgenkendelse,' this subset constitutes approximately 19.59% of the estimated population (n=10,704) identified by Infomedia using the same search term, making the sample robust in terms of volume.

The descriptive statistics in Table 4 shows a summary of the sample characteristics across the variables *outlet source, media categorization* and *partisan leaning*.

[6] The study was not able to simply use Infomedias API for retrieving articles due to funding limitations.

Table 4: Descriptive statistics: sample characteristics

Variable	**Full sample (n=2681)**	
	Count of articles	**Percentage**
Source		
Computerworld	465	17.34
Politiken	360	13.43
TV2	294	10.97
Jyllands Posten	269	10.03
Finans	203	7.57
Kristeligt Dagblad	179	6.68
Berlingske	162	6.04
BT	150	5.59
DR	146	5.45
Teknologiens Mediehus	138	5.15
Ekstra Bladet	122	4.55
Information	108	4.03
Nordjyske	53	1.98
Jydske Vestkysten	32	1.19
Media categorization		
National broadsheet	899	33.53
Specialized publication	806	30.06
Public service	440	16.41
Tabloid	272	10.15
Regional paper	264	9.85
Partisan leaning		
Right-leaning	792	29.54
Technology-focused,non-political	603	22.49
Left-leaning	590	22.01
Neutral, non-political	440	16.41
Finance-focused, non-political	203	7.57
Center	53	1.98

Note: The table outlines the descriptive statistics of the entire article sample.

With respect to media sources, the smaller, niche outlet *Computerworld* appears as the largest contributor of articles on FRT, as its content generally zooms in on advancements and discussions of various technologies. Aligning with this observation is the high proportion of articles published by specialized publications, accounting for 30.06% of the sample. Yet, national broadsheet papers hold a slightly higher representation in the sample at 33.53%.

Although TV2's search functionality limited results to the first 100 articles per search term during the data collection (see section 5.3), leading to an underrepresentation in the dataset, the outlet still managed to rank among the top three publishers of articles mentioning FRT. This match with the expectations: Public service outlets, including TV2, generally dominate the Danish media environment (Slots- og Kulturstyrelsen, 2019), so it is expected that a large proportion of the articles would be published by these, with TV2 accounting for 10.97% of all articles in the sample. Contrastingly, DR's low share of 5.45% may reflect its objective to appeal to a wide audience by creating content 'for all' (DR Analyse, 2024), resulting in less coverage of specialized technology such as FRT.

In terms of partisan leaning, the sample seem to correspond to the broader trends in the political news media environment: Denmark continues to be dominated by news media with a "conservative value foundation" (Kjærgaard, 2019), which reflects the sample partisan leanings by having the largest share of approximately 30% right-leaning media outlets. However, with only a 8.53 percentage points difference between right- and left-leaning outlets, the sample is still relatively balanced between partisan leanings, suggesting that the topic of FRT is of interest across ideological orientations.

6.2 Frame analysis

As outlined in chapter 2, each of the identified frames represents a specific 'slice' of reality in the news media coverage of FRT. Below, the frames identified during the qualitative frame analysis, which was conducted on a subset of 90 articles from the dataset presented in Section 6.1, are outlined. A more comprehensive description of each frame can be found in the operational definitions available in Appendix6. For each frame, included quotes have been translated to English, however, the original Danish articles can be accessed through their references.

Surveillance and Privacy Concerns: This frame presents FRT as a tool which is cause for concern in terms of anonymity, misuse of personal data and potential privacy violations. It emphasizes the potential consequences of the technology on individual privacy and civil liberties, particularly in relation to governmental- and law enforcement use. For example:

> *"In the EU, the use of facial recognition technology is only permitted in strictly limited cases […]. Justitia highlights that the police's use of this controversial technology in Denmark could constitute a serious infringement on citizens' right to privacy, as unique biometric codes for faces are registered and tracked without consent."* - *Jensen (2024).*

Orwellian Surveillance: Portrays FRT using more dystopian narratives, referencing its deployment in society as a slippery slope towards totalitarian control and oppression. It draws on symbolic comparisons, science-fiction inspired analogies and/or sets up parallels to the Chinese surveillance state. For example:

> *"Extreme surveillance in China – everyone is scored based on their behaviour. [...] It might sound like a dystopian surveillance system similar to George Orwell's famous novel 1984, published in 1949 and describing a totalitarian state, and that's not entirely wrong."* - *Boutrup (2018).*

FRT as a tool for Security and crime prevention: Opposite the two aforementioned frames, this frames the technology in a more positive light as a potential answer to security threats, a tool which society could benefit from, able to identify criminals and prevent crimes and terror. The frame is primarily utilized in advocating for the implementation of FRT in law enforcement. For example:

> *"It's about looking at criminal law provisions and giving the police the right tools. And here, facial recognition is a 'really, really good idea,' he says. - As it is today, the police have to spend a lot of hours reviewing video footage, and as I understand it from the police, with the help of good technology, one would be able to review all the material very quickly," says the minister."* - *Klinge (2024).*

FRT: the new standard: FRT is presented as a convenient feature in our everyday-life electronics such as phones, computers, cameras, cars, etc., or portrayed as a tool with far-reaching possibilities in various sectors such as healthcare or sustainability. The framing is predominantly positive. For example:

> *"Alternatively, the front camera can be used for facial recognition, but here the Samsung S10 is less convincing compared to the latest flagship phones from Apple and Huawei. […] I'm also a fan of how a few pixels light up around the front camera when it scans your face. It's an elegant way to guide the user to look in the right direction while being identified."* - *De Boissezon (2019).*

Algorithmic bias and discrimination: Presents FRT by emphasizing how biases are embedded in the technology, which can potentially lead to discrimination and unfairly targeting of individuals, for example, based on gender or skin tone. The frame further captures articles portraying FRT as a tool for surveilling immigrants and/or other marginalized groups. For example:

> *"AI technologies for facial recognition are rife with examples of unintended bias, such as difficulties in identifying individuals with darker skin tones. Therefore, now that the police have been authorized to use such systems to track and apprehend criminals, it is crucial to examine whether all skin tones are adequately represented."* - Hildebrandt (2024).

Although nuances in the framing of FRT exists on a more granular level, the decision of aggregating the portrayals of the technology into five overarching frames relies firstly on the notion of compliance with the general requirements of frame identification, ensuring that the identification of frames is recognizable across multiple researchers (see section 5.4.1). Secondly, it directs the focus towards the broader portrayals in the media discourse. And thirdly, aggregating them into fewer but distinguishable frames enables the extrapolation of the findings to the full dataset of news articles. The following sections will present the results of this.

6.3 Frames across the entire article dataset

This chapter presents the results of the identified frames extrapolated to the entire dataset of 2,6821 articles. It is divided into three parts: 6.3.1 presents the aggregated frame frequencies, 6.3.2 outlines the trends over the decade, and 6.3.3 shows the frame distribution across outlets with aligning partisan leanings.

6.3.1 Frame frequency

Extrapolating the identified frames from the qualitative analysis to the entire sample of news media articles shows the distribution and predominance of the frames over the past decade. The frequency of each is provided in Table 5.

Table 5: Frame Counts and Percentages Across News Articles

Frame	Count	Percentage (%)
FRT: the new standard	929	34.67
FRT as a tool for Security and crime prevention	810	30.21
Surveillance and privacy concerns	777	29.00
Orwellian Surveillance	687	25.63
Algorithmic bias and discrimination	473	17.65
No frame identified	235	8.76

Note: The table shows the aggregated frequency of each frame over the time period, including number of articles which did not have an identified frame. % are calculated relative to the total number of articles (n = 2,681). Since an article can include multiple frames, the counts exceed the total number and the percentages sum to more than 100%.

As visible in the table, *FRT: the new standard* is the most commonly employed frame in the sample, utilized in 34.7% of the articles in the sample. The second most frequently used frame *FRT as a tool for security and crime prevention* is closely followed by *Surveillance and privacy concerns*, with a difference of only 33 articles. Although second to last, the frame of *Orwellian surveillance* is still employed in a fair share of articles, whereas the frame of *Algorithmic bias and discrimination* is employed the least.

Since news articles often report stories using multiple perspectives or angles, the paper expected that several frames too would be employed in the coverage of FRT. As the classifier for each frame conducts separate dichotomous tasks, it evaluates the presence of a frame independent of the others, enabling overlaps where articles utilize multiple frames. Table 6 presents the five most dominant combinations of frames within a single article.

Table 6: Frame Combinations Across News Articles

Frame 1	Frame 2	Overlap Count
FRT as a tool for Security and crime prevention	Surveillance and privacy concerns	337
Orwellian Surveillance	Algorithmic bias and discrimination	267
FRT: the new standard	Surveillance and privacy concerns	186
Algorithmic bias and discrimination	Surveillance and privacy concerns	134
Orwellian Surveillance	Surveillance and privacy concerns	129

Note: The table shows the combination of frames, ranked by frequency. Combination indicate that an article employs both frames within the same article. Only the five most common combinations are included.

It is thus evident that multiple frames are often present in articles of FRT, with the combination of *FRT as a tool for Security and Crime Prevention* and *Surveillance and Privacy Concerns* being the most common. The frame combination of *Orwellian Surveillanc*e and *Surveillance and privacy concerns* make up the least employed combination of the five, which is in line with the intentions behind the frame definitions: Even though both frame the technology as a cause for concern, they do so using very distinct linguistic and rhetorical devices in their depiction, leading to only one being typically used in articles emphasizing privacy concerns.

6.3.2 Diachronic results

The results over time are presented first by outlining the trends in published articles over the decade and how this coincides with events related to FRT, followed by the development of frame usage over the time period.

Temporal trends in FRT coverage

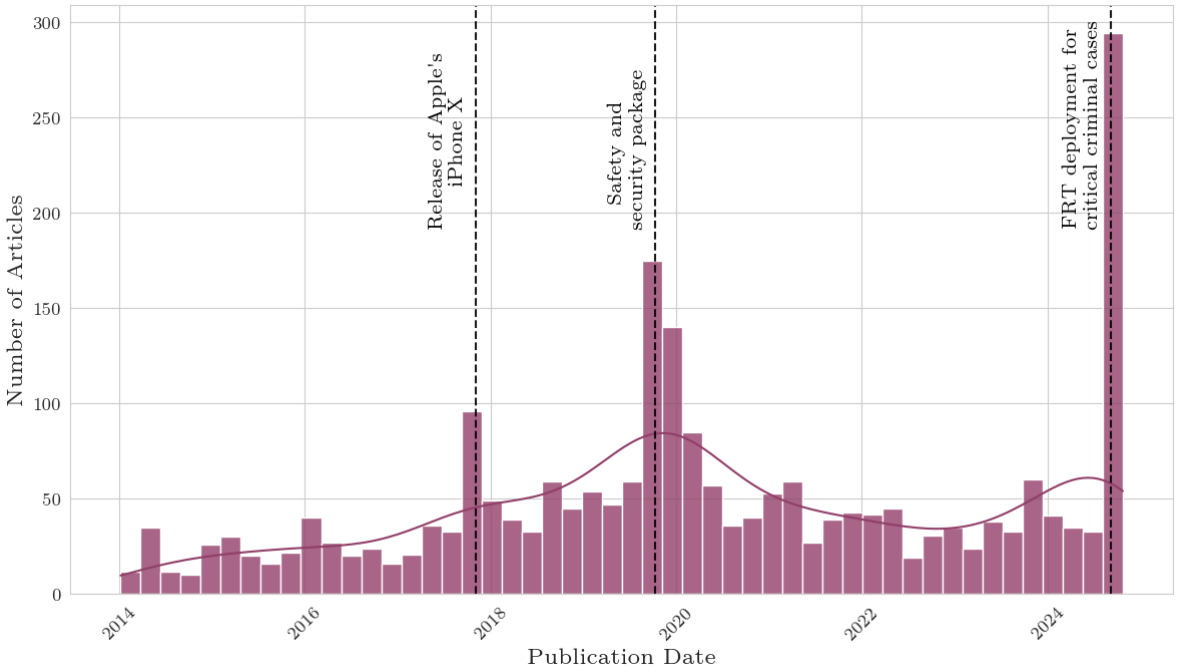
The number of articles discussing FRT has increased over the past decade, particularly within the last five years with three larger spikes, culminating in 2024, as shown in Figure 3. In investigating the articles during these periods, it becomes visible how these are primarily published with the occurrence of events or policy changes related to FRT. The general messages conveyed during these spikes were identified through close-reading the articles and are outlined below, with their corresponding dates included in Figure 3 below and Figure 4 in the following chapter.

November 3rd, 2017, Apple released the IPhone X, receiving much media attention as it introduced FaceID, replacing the biometric fingerprint scanner. This created debate of FRT with an emphasis on privacy and security matters, but also generated much positive publicity, presenting it as a convenient feature (e.g., Madsen, 2017; Kildebogaard, 2017).

On *October 10th, 2019*, Danish Minister of Justice, Nick Hækkerup, introduced the *Safety and Security Package*, an initiative to enhance safety in Denmark, through, among other measures, more surveillance, as a reaction to the explosions that had happened in Copenhagen earlier that year. Hækkerup expressed general support for technology helping law enforcement to prevent

crime but avoided directly commenting on FRT's implementation when journalists questioned him about it (Jørgenssen, 2019).

Figure 3. Article distribution over time: Developments in media coverage of FRT



Note: The plot shows the developments published articles from 2014 to 2024. The smaller spikes in 2014 and 2016 are not marked with a line in the plot or discussed in the analysis due to the relatively lower number of articles compared to later spikes.

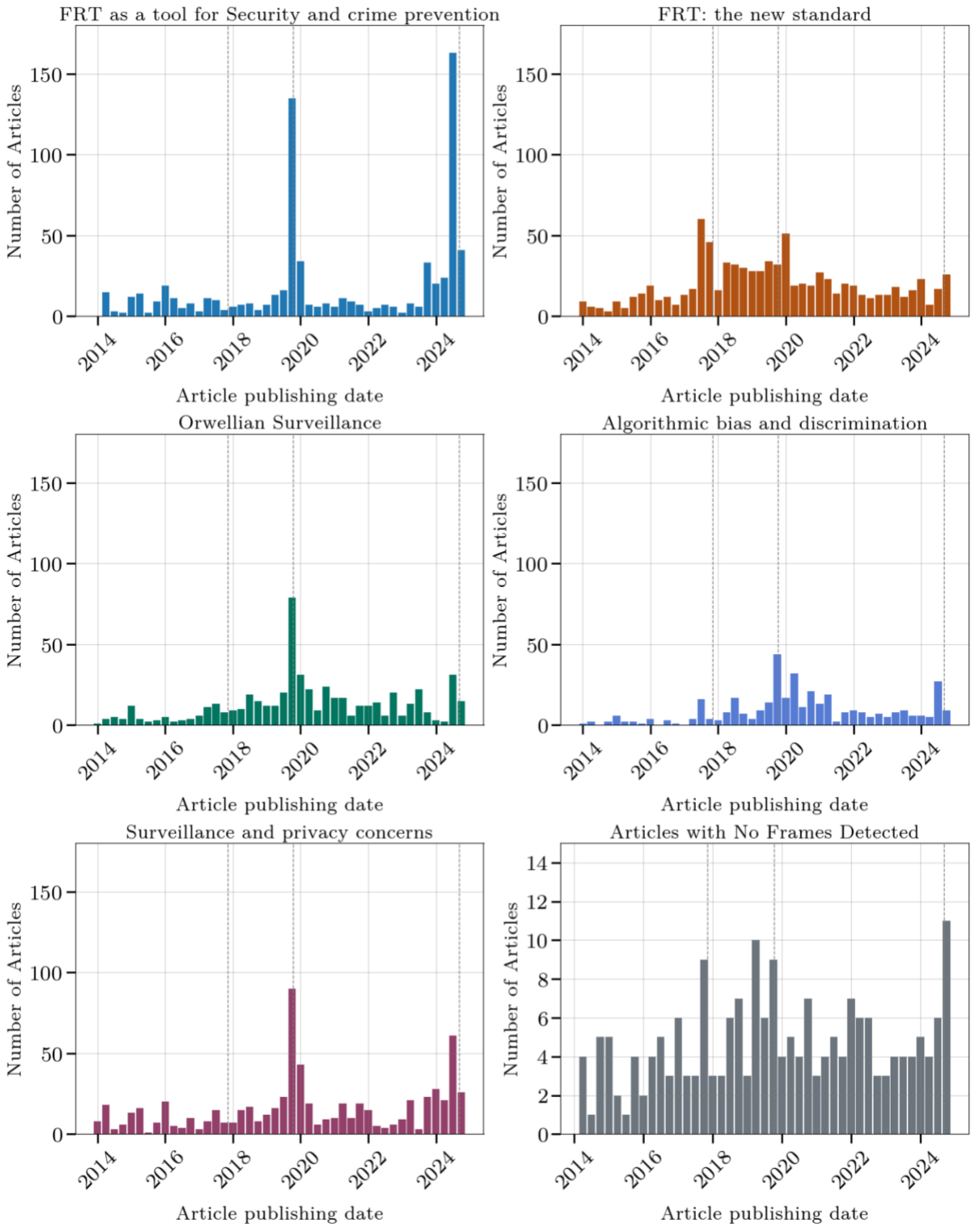
More recently on *September 5th, 2024,* the Danish government decided to allow law enforcement to use FRT in serious criminal cases, as previously expanded upon.

This alignment of article spikes with events that arguably increases media attention on FRT, suggests that the dataset captures media coverage that is directly relevant to FRT, thus reflecting the presumed real-world media behaviour and strengthens construct validity of the sample. This assertion is further supported in the following section on frame distribution over time.

Frames over time

The analysis of frame distribution of FRT in news media coverage from 2014 to 2024 shows a development in frame usage, as Figure 4 demonstrates.

Figure 4. Article Counts by Frame Over Time, Including No Frames



Note: The plots show the development of frame usage from 2014 to 2024. The y-axes for all frame-specific plots are identical, except the plot for articles with no frame. Articles without a publishing date (n=320) are not included in the plot or analysis investigating frame usage over time. The vertical lines reflect the dates outlined in 6.3.2.

In the year leading up to and including the first half year of 2017, a fairly mixed framing was employed across a smaller amount of published articles per month (2014: M[7] = 6.67; 2015: M = 9.00; 2016: M = 9.67), however, with *FRT: the new standard* used most frequently. This persists as the dominant frame through the first spike in coverage in 2017 and up until 2019, where the news articles start having a more diverse portrayal of FRT in line with more articles being published on the topic. However, during the second spike between October 2019 and February 2020, the media coverage largely used the frame of *FRT as a tool for security and crime prevention* in its portrayal. While employed less thereafter, it increased drastically again as the general amount of articles published on the topic increased in August and September 2024. Following the same trend, although to a slightly lesser extent, is the employment of the frame *Surveillance and privacy concerns*.

The *Orwellian surveillance* frame has remained somewhat consistent throughout the years but experienced an increase in frequency in 2019. *Algorithmic bias and surveillance* had the lowest employment frequency the past decade, particularly before 2019, but have seen an increase in usage thereafter. The distribution of articles which did not employ any of the five frames in their coverage of FRT, have been relatively consistent over the years, however, increased during times where the general volume of articles published similarly increased.

Besides showcasing the developments in frame usage, Figure 4 further demonstrates that the classifiers' frame extrapolation corresponds to expectations regarding which frames that are more likely to be employed during the spikes. For example, the frame *FRT: the new standard* is prevalent during spikes when the new iphone is released, and *FRT as a tool for security and crime prevention* as well as *Surveillance and privacy concerns* are predominantly used during periods where the government is discussing the technology's deployment into society. As such, it suggests that the classifications of the models seem reliable and that they performed well in identifying the patterns in the data. Extendedly, it signalizes the computational methods' predictive abilities in extending the depth of the qualitative social science findings, exemplifying the hybrid nature of social data science.

[7] M denotes the mean number of articles per month during each year.

6.3.3 Frame distribution by partisan leanings

Aggregating the use of frames over the past decade, Table 7 shows that frame employment varies by partisan leaning for the media outlets included in the current study.

Table 7: Frame Distribution Across Partisan Leaning Categories

Frame	Left-leaning		Centrist		Right-leaning		Others	
	Count	%	Count	%	Count	%	Count	%
FRT as a tool for Security and crime prevention	195	22.01	23	33.82	316	29.90	276	16.58
FRT: the new standard	137	15.46	16	23.53	179	16.93	597	35.86
Orwellian Surveillance	223	25.17	10	14.71	203	19.21	251	15.08
Algorithmic bias and discrimination	166	18.74	5	7.35	122	11.54	180	10.81
Surveillance and privacy concerns	165	18.62	14	20.59	237	22.42	361	21.68
Total	886	100.00	68	100.00	1057	100.00	1665	100.00

Note: The table shows the count and percentage of each frame across outlets with aligning partisan leaning. The 'Others' column include all outlets without a partisan leaning (see Table 4). The total article count exceeds the total number of articles for each partisan group, as a single article can contain multiple frames.

Left-leaning outlets appear as generally more sceptical in its framing of the technology, as these are the biggest contributors of articles employing the frames *Algorithmic bias and discrimination* (18.7%) and *Orwellian surveillance* (25.2%), compared to other partisan groups in the sample. When including the share of *Surveillance and privacy concerns* frame occurrences, it amounts to a total of 62.5% of their total frame occurrences that are attributed to frames which portray the technology through a lens of concern. Contrastingly, the center stance appears to have the highest share of the *FRT as a tool for security and crime prevention* frame (33.8%), with right-leaning outlets closely following (29.9%). The latter, although frequently presenting the benefits of the technology through its 46.8% combined share of *FRT as a tool for security and crime prevention* and *FRT: the new standard*, does however also focus on its risks, as indicated by the highest share of *Surveillance and privacy concerns* frame occurrences of partisan groups at 22.4%. The following chapter will, among other, discuss these results and reflect upon their implications.

7. Discussion

In Chapter 4, three research questions were asked. This chapter addresses them as follows: First, the frames identified in the qualitative analysis are reflected upon in section 7.1, before the findings of the aggregated frame dominance and frequency is discussed in section 7.2. Both section 7.1 and 7.2 relate to the first research question. These are followed by a reflection on the development in frame usage over the past decade in 7.3, directed at the second research question. Following this is section 7.5, addressing the final research question in exploring how the coverage of FRT may differ across media outlets grouped by their partisan leanings.

7.1 The five identified frames

In conducting the qualitative frame analysis, five frames were identified in the article sample of Danish media outlets. From these, it becomes clear that the discussion of FRT in Danish news media speaks into much broader conversations of politics, as *three* of the identified frames have at their core the notion of how Danish society should be structured and protected, benefitting its citizens - although the 'how' in the matter vary greatly:

Aligning with the findings of previous research, FRT is portrayed in danish media as a tool which is cause for concern (Shaikh & Moran, 2022; Eireiner, 2020), through the frames of *Surveillance and Privacy Concerns* as well as *Orwellian Surveillance*, although with varying degrees of alarm. Zooming in on the latter, this frames the technology in a sombre manner, similar to the discourse which historically has followed its parent category, AI. This supports the postulations of Goode (2018), that science fiction and news media are interwoven, as well as Eireiner's (2020) observations of dystopian pervasiveness surrounding FRT. The depiction in Danish media further suggests that the implementation is not just related to FRT itself, but is entangled with the concept and question of freedom: Articles draw frequent parallels to the state surveillance in China; the implementation of FRT is equated with the exaggeration that citizens might just as well "*get chips implanted in their necks*" (Kastrup, 2019); concepts from the dystopian novel *1984* like 'newspeak' are used, for example, when mass surveillance is referred to as "tryghedskameraer"[8] (Hansen, 2017); and the Danish government is compared to the "Ministry of Truth" because of what they perceive as a more authoritarian governance style than previously seen (Jensen, 2020)[9]. The frame thus presents a very different reality than

[8] Translated: safety cameras.
[9] All included references are from articles in sample.

the other frames, extending beyond the police simply using a new technological tool but speaks into much broader values of a democratic society, the perceived ethical dubiousness and the government's powerful (and potentially controlling) position in its deployment. The *Orwellian surveillance* frame is most prominent in articles presenting a single slice of reality (i.e., using only a single frame), where, on the other hand, when articles discuss the technology by presenting both its advantages as well as its risks, the more pragmatic frame of *Surveillance and Privacy Concerns* is generally used, reflecting the 'concerned'-side of the matter.

In contrast to these two frames, *FRT as a tool for Security and crime prevention* is used in articles, advocating for the deployment of the technology for law enforcement use with the argumentation that it will aid criminal investigations and making society safer - and, at the more extreme end of this frame, subscribing to the often-quoted expression in news articles published thereafter, spoken by the former Minister of Justice, that '*more surveillance provides more freedom*' (Hækkerup, 2021). Such a narrative is presumably the product of a very specific cultural reality (Entman, 1993) with a high level of trust that the government and police will use such tools responsibly (OECDa, 2024), in combination with national crime-related problems like gang violence, leading to public safety being prioritized over the potential associated privacy risks.

However, not all identified frames are inherently political: *FRT: the new standard* has a different focus than previously seen, resembling more the findings of Sun et. al (2020) in terms of AI, which observed how the media often frames AI as a solution to common problems. However, it contrasts this by having its main focus on consumer electronics, although also encompassing coverage on FRT's capabilities. Similarly, the current paper recognised the *Algorithmic bias and discrimination* frame in which bias is presented as embedded in the technology, aligning with the findings of Shaikh & Moran (2022). Both frames are further expanded upon in section 7.2 and 7.3, respectively.

In summary, addressing the first part of RQ1, this paper concludes that five overarching frames generally are employed in discussing FRT in the Danish news media articles in the sample. These pertain to issues of crime prevention, privacy risks (represented through two frames with varying degrees of alarm), technological advancements, and bias and discrimination.

7.2 Frame frequency and agenda-setting

As contemplated in section 3.3, which discussed why the study of news media framing could prove interesting in the case of Denmark, the extrapolation of frames to the entire sample shows a different frame trend than seen in previous studies: As *FRT: the new standard* and *FRT as a tool for security and crime prevention* are the most frequently employed frames over the past decade, it places the only two identified frames which reflect a more positive light on the technology as the dominant ones in the Danish news media coverage. Although the studies of Shaikh & Moran (2022) and Eireiner (2020) similarly identify frames and narratives presenting the technology favourably, these were far from predominant, with most coverage portraying the technology as problematic, which contrasts with the observed frame usage in this study. It may thus seem that the countries are not as culturally aligned across borders as one might think, at least not when it comes to matters of FRT, and therefore stresses the influence of national-, cultural- and political factors in how reality is understood and, as a result hereof, how it is further conveyed in news articles. Danish media outlets in the sample hence sets an agenda differently than previously seen, giving more attention to these two frames through more extensive coverage:

Despite finding it difficult to understand the technology behind FRT and its distinction from ordinary camera surveillance (ADD, 2021; Milestone Systems, 2024), the Danes are among the EU populations with the highest digital proficiency (Klimadatastyrelsen, 2024), further indicated by their swift adoption of the latest electronics, with Danish households being generally equipped with the newest technology (Danmarks Statistik, 2023). It may thus be no surprise that *FRT: the new standard* is the most dominant frame, where outlets create coverage that matches the danes' interest in technology and consumer electronics, which, in response, further reinforces this interest.

Similarly, the frequent use of the *FRT as a tool for security and crime prevention* go hand in hand with how the government is addressing the challenges with violence and crime in Danish society. With the population exhibiting high trust in their government (OECDa, 2024), it may contribute to a more general acceptance and support of the arguments posed by it, influencing the media framing.

Thus, when it comes to the topic of FRT in news articles, the Danes have been exposed more extensively to narratives portraying the technology as useful to society given its safety enhancing and crime prevention qualities as well as innovative in its applications in electronics.

The implications of these findings imply that the frames and their frequency of use ultimately influence public opinion and understanding of reality related to the technology - that is, after all, the premise of frame- and agenda-setting theory (see Chapter 2). However, even though this study does not investigate the influence of the frames directly[10], it will bring attention to an interesting connection: just two days before the writing of this chapter, a poll on public opinion of FRT in Denmark was published, supporting the theorizations, as it show how public support for police use of FRT is high with 84% of the population having a positive attitude towards it (Milestone Systems, 2024). Without making any claims of causality, this finding, however, seems to support the conceptualization of the theories. It suggests that the news outlets both reflect the cultural reality by publishing based on the technological interests of the Danes and the priorities of the government, but also reinforce these narratives by setting the agenda and frequently frame the technology in this way, influencing the readers.

Having said that, the results of the current study further show that the *Surveillance and privacy concerns* frame follows *FRT as a tool for security and crime prevention* closely in frequency, calling attention to the duality in how FRT is framed which lies at the very heart of the discussion of the technology: the balance between improving security and protecting personal privacy. This is further observed in examining the combinations of frames used within a single article, which corresponds to the expectations from the qualitative analysis: when discussing the benefits of FRT, it is frequently accompanied by the portrayal of the technology as a cause for concern, leading to highest amount of articles in the sample employing these two frames in their presentation of the technology to the readers. Thus, despite most attention has been given to depicting FRT as a capable and convenient feature over the past decade, much coverage utilizes frames representing either side of the discussion[11].

In summary, addressing the second part of RQ1, the analysis concludes that the frames of *FRT: the new standard* and *FRT as a tool for security and crime prevention* dominate the discourse. However, frames pertaining to privacy follows closely, indicating an overall balanced portrayal in the Danish news media articles in the sample.

[10] See future research Chapter 8.
[11] *Orwellian Surveillance* contributes to the "concerned" side, but is not included this argument, as its fear-based portrayal differs from the more pragmatic concerns discussed. This is also evident in the lower combination count with *FRT as a tool for security and crime prevention* (Table 6).

7.3 Frames over time

In investigating the distribution of frames over time and turning to the second research question of the paper, Figure 3 and 4 shows that we observe various developments. The number of articles covering FRT has increased throughout the years, with spikes coinciding with political debates or technology releases. The primary frames used during two of the three spikes indicate that the media prioritize and direct the readers' attention to the technology through *FRT as a tool for security and crime prevention* and *Surveillance and privacy concerns* - i.e., discussing both sides - in times when questions about its implementation are raised by the government. Outside of these periods, however, the two frames are used very little, indicating that these discussions of FRT and its deployment in Danish society are closely tied to policy debates, generated by the government.

While having not experienced the same kind of frequent and massive spikes as the aforementioned, both *Orwellian surveillance* and *FRT: the new standard* maintains a consistent presence throughout the decade. For the former, such persistence suggests that a lingering and 'dark' framing of the technology persists, a smouldering undertone, influencing the discussion and perceptions of FRT. However, during the last spike in 2024, the *Orwellian surveillance* frame was much less employed compared to in 2019 when the government mentioned FRT in its surveillance plan. Could this be indicative of a starting normalization of the technology? Especially now that its deployment has been agreed upon for law enforcement use, FRT may be on its path - if the trend continues - to becoming less and less a concept of fear and science-fiction, but one reality and practicality. Such a portrayal in future media coverage might thus indicate a shift in narrative similar to that seen for AI in the US, towards something more pragmatic rather than dystopian (Nguyen & Hekman, 2022).

The persistent use of the frame *FRT: the new standard* the past decade further assists in this speculation of a normalization process; its consistent employment in media coverage and smaller spike in 2017 with the release of the iPhone, draws attention to FRT as being a completely normal part of our everyday life. However, the use of the frame experienced a slight decrease in more recent years, with its peak period being already a couple of years back, from 2019 to 2021. Although still highly employed, this decrease could suggest that, as the technology becomes normalized, it goes from being seen either as a technology to fear or a cool electronic feature, to that of a practical tool in society, which comes with a new set of

concerns. For example, the *Algorithmic bias and discrimination* frame has experienced 3.5 times more employment in frequency in the later part of the decade than the first (i.e., n=83 before 2019-01-01 and n=298 after 2019-01-01), indicating that as we are becoming more aware of the technology, its risks, other than those related to privacy, are being recognized.

As such, the various developments in frame usage over time underscores the dynamic nature of framing as posited by Klein and Amis (2021): Even if dystopian framing may be used less and less as FRT becomes a more normal part of our reality, concerns persists but may now just unfold in other ways besides being tied to risks associated with privacy and anonymity, such as those related to algorithmic biases and discrimination.

In summary, addressing RQ2, the paper thus concludes that the coverage of FRT and its frame usage has changed over the decade with the occurrence of various FRT-related events. During periods where the technology's deployment is politically discussed, it is most frequently framed as a crime prevention tool or a cause for privacy concern. The analysis finds that more dystopian frames may be used less as the technology becomes a more integrated part of everyday life. However, frames related to concerns do not disappear but may instead shift focus to other areas.

7.4 News media partisanship and frame usage

The analysis show, that the use of frames differs according to media partisanship. While non-political outlets (primarily constituted by tech- or finance-focused outlets, see Table 4) largely employ *FRT: the new standard* in discussing the technology, outlets with a partisan leaning use this frame more rarely, indicating how these portray FRT in relation to societal discussions rather than emphasizing its technological capabilities or implementation in everyday electronics.

Left-leaning media outlets generally appear bleaker in their framing, given that 62.5% of their total frame occurrences are attributed to the frames *Surveillance and privacy concerns, Algorithmic bias and discrimination* or *Orwellian Surveillance,* compared to 53.2% for right-leaning outlets. Consistent with the results of Shaikh & Moran (2022), left-leaning

outlets discuss biases and/or discrimination in relation to the technology more often than right-leaning media outlets. These, on the other hand, associated FRT with its capabilities rather than its risks in 46.83% of its frame occurrences, using either *FRT as a tool for security and crime prevention* or *FRT: the new standard.* As Shaikh & Moran (2022) similarly find right-leaning media to frame the technology as a solution more than left-leaning outlets, and especially focusing on how FRT can help solve crimes, the results of the current study support this observation.

As such, frame usage among partisan-leanings are accordant with their respective positions on the political spectrum: Left-leaning politics generally advocate for equality and civil liberties (Bille, n.d.), aligning with left-leaning outlets' higher share of articles which frame the technology with a focus on bias and discrimination and a general scepticism. Right-leaning politics, on the other hand, focus, among other, on law and order (Madsen, 2020), and thus, although recognizing that the technology comes with risks (cf. their 53.1% share of using frames portraying concerns), right-leaning outlets more frequently frame it as a tool to combat crime than left-leaning outlets.

Following the postulations of frame- and agenda-setting theory, and although the differences are somewhat modest, this may suggest a potential partisan divide in reader's attitude towards FRT, depending on which outlets they receive their news from: Readers subscribing to left-leaning outlets, exposed to more scepticism, could be exhibiting more caution towards FRT, whereas readers of right-leaning outlets may perceive the technology slightly more beneficial. As such, the frames and how consistently in frequency they are employed may not only be a reflection of the media's perspective, but a way of influencing readers' perceptions and attitudes - readers who ultimately will go on to affect political decisions by voting for the future deployment of such technologies in society.

Finally, in summary and addressing RQ3, this paper concludes that the frame usage differs according to the partisan leaning of the media outlets in the sample. Left-leaning outlets frame the technology more in relation to its biases and risks than right-leaning outlets. The latter, although also presenting its risks, more frequently than left-leaning outlets employ frames emphasizing the benefits of FRT.

8. Study limitations and future research

Several limitations should be kept in mind when interpreting the research findings. The first pertains to the subjective nature of frame identification. In analysing how the articles perceive reality and frame FRT, so too has this process likely been influenced by the cultural knowledge and perspectives of the author of this study. Even though attempts have been made to accommodate this through inter-rater reliability and a transparent, reflexive frame identification process, it remains a limitation. Extendedly, as both the Krippendorf's α values and classification models' performance metrics showed that broader frames, which can be applied to more varied content, are more difficult to classify, it suggests that future research should spend additional time in the frame definition and refinement process.

Another limitation relates to the sampling bias occurring when using purposive sampling: Given the paper only sampled articles from news outlets which had granted their permission, it limits the generalizability of the findings to the entire Danish media environment and decreases external validity (Salganik, 2018). As such, even though the sample of articles appears robust in terms of volume relative to the estimated article population for the investigated time period, as outlined in section 6.1.1, it still likely lacks representativeness as result of this sampling. This point is further stressed by the restrictions posed by the media archives on the outlets' websites during data collection, for example by only showing the first 100 results despite indicating that more relevant articles exist. As a result, this has led to an underrepresentation of certain outlets, which could potentially affect the results by not having included all relevant articles in the analysis.

Based on these limitations, the research rests its focus on the observed dataset and does not claim representativeness of the article population. However, also when interpreting the findings within this sample, considerations must be kept in mind: In certain months, only a fairly low number of articles were published, particularly in the early years of the analysis, which potentially skews results. Furthermore, the paper does not have an equal number of articles within each of the partisan categories, most notably a limitation for the center-stance partisan category, only constituted by a single outlet.

Additional limitations pertain to the computational methods. Besides the argument that these arguably cannot match the quality of a human interpreter in conducting frame analysis, another

limitation is embedded in the logistic classification models, assuming that each observation in the dataset (i.e., articles in this research) is independent of the others (Agresti, Franklin & Klingenberg, 2017). As the current study works with articles extracted from outlets all operating within the same media environment, articles previously published likely influence the framing of those published after. For example, as outlined in the literature review, news coverage of FRT has become increasingly critical over time in the US (Nguyen & Hekman, 2022). If a similar situation applied for the Danish coverage, it is a sign of a shared discourse where published articles may indirectly influence each other in the way the technology is presented. As such, this cannot be avoided when exploring news media articles using this method, but is, nevertheless, a limitation.

Consequently, these limitations call for further research. Besides addressing the limitations of this paper, future studies could combine or expand the analysis to other mediums: Despite news articles traditionally having been employed for frame analyses, they are only one part of contemporary public spheres. Social media data could further be interesting to investigate, taking up a larger share of where Danes get their news information from each year, particularly young adults (Danmarks Statistik, 2024).

In addition, although supported by various previous studies, the current paper's findings do, nevertheless, hinge on the theorizations of frame- and agenda-setting theory in assuming that frames influence readers' reality and they are mostly descriptive. Another suggestion for future research could hence be to investigate the influence of the frames directly to establish their effects in this situation, further adding to the understanding of media framing of FRT in Denmark.

9. Conclusion

Facial recognition - a technology which raises inherently political and societal questions - has increasingly taken centre stage in news media within recent years, particularly as its deployment in Danish society has been discussed politically and as of September 2024, formally approved for police use. This paper has charted the framing of FRT in the Danish media article coverage between 2014 and 2024. In doing so, it sought to answer three questions, addressing the frames underlying the coverage and which dominate, the developments of frame usage over the past decade and the differences in coverage depending on partisan leaning of media outlets.

Based on the analysis, this paper concludes that Danish news media in the sample portray the technology through five overarching frames pertaining to issues of crime prevention, privacy risks (represented through two frames with varying degrees of alarm), technological advancements, and bias and discrimination. Aggregated over the time period, more positive frames were found to dominate the discourse, as these were most frequently employed when discussing FRT. Such findings contrast with previous research and stress the potential influences of national-, political and cultural factors on its frame usage. However, privacy-related framing follows closely in frequency, emphasizing the duality of the socio ethical dilemma central to the discussion of FRT, and results in an overall relatively balanced portrayal of the technology in the news coverage, where both benefits as well as risks receive media attention.

The paper further concludes that the coverage of FRT is not static, having experienced various trends in frame usage over the decade with the occurrence of various FRT-related events or policy developments. The analysis also suggest that we may currently be witnessing the early stages of a potential normalization process, where concerns expressed through dystopian framing may become less. However, concerns persist but may now just unfold in other ways, for example, by increasingly shifting to risks related to algorithmic biases and discrimination.

Finally, the paper concludes that the coverage of FRT differ according to the partisan leaning of the news outlets in the sample; right-leaning outlets focus more on the benefits of FRT as a crime prevention tool than left-leaning outlets, which, instead, frame the technology more in relation to its risks of privacy violations and algorithmic bias. Such differences, although

modest, may potentially lead to different public perceptions of FRT - where audiences of right-leaning outlets have one and audiences of left-leaning outlets another -, potentially contributing to subtle ideological divides over the support or opposition of the technology.

Despite the decade's coverage appearing relatively balanced in its portrayal of FRT through the employed frames overall and having experienced various trends over time, subtle biases seem to exist. By identifying these, this paper hopes to inspire journalists and news media outlets to critically reflect on their framing practices, leading to even more balanced portrayals in future coverage and contributing to a more constructive public discussion. Extendedly, this may, in turn, help ensure that the societal acceptance or further adoption of FRT will align with democratic values and public interests, where the Danish citizens approach the question of technologies like FRT based on well-informed grounds and a sufficient conceptual understanding of both the risks and benefits it poses.

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Appendix

All appendices are available at Github following the link:
https://github.com/Norgreen/FRT-Media-Framing-Thesis

This repository contains the code and scripts in addition to all documents of written consent for data collection, legal guidance from UBVA, frame definitions and processes.

The README file in the repository provides an overview of its structure, which similarly is outlined below:

Appendix 1: written permissions
Contains all documents of written permission from the media outlets + article agreements. Note that there are fewer documents than media outlets, as some outlets are owned by the same parent company

Appendix 2: UBVA
Contains the email correspondance with UBVA (Udvalget Til Beskyttelse Af Videnskabeligt Arbejde). These were further consulted in relation to the Copyright Act.

Appendix 3: Webscrapers
Contains scripts for all 14 webscrapers developed for extracting data for each media outlet.

Appendix 4: EDA
Contains the notebook for concatenating dataframes from each media outlet collected through each scraper, with initial cleaning before doing EDA.

Appendix 5: Frame analysis
Contains the articles analysed during the frame analysis, labelled with various frame categories which were adjusted in each round until the final frames were identified. Definitions of final frames are in Appendix 6.

Appendix 6: Operational frame definitions
Contains the operational definitions of the finalized frames.

Appendix 7: Classification models + Results
Contains the notebook for developing the classification models, predicting on the unlabelled data and conducting the results. This also contains information and details on various decisions made for the classification models, which could not be included in the thesis because of the character limits.