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Staying Fit with AI:
Exploring FitBrokoli Through the Perspective of RRI

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Introduction

Considering the rapid developments in the area of Artificial Intelligence (AI), different opinions regarding the usage and development of AI are shaped in society. While some people have concerns with the integration of AI into our daily lives, others consider it a powerful tool that will be decisive in our future innovations. In this context, the understanding of responsible innovation and research plays a crucial role in shaping and integrating these technologies into societies, while also considering various opinions that are present in the society. From this point of view, the application of Responsible Research and Innovation (RRI) techniques to this technology becomes essential [1].

In our research, we are focusing on an AI-driven dietician service company, FitBrokoli, and evaluating the presence of RRI dimensions within the company's approach. This report aims to examine the social, cultural, and technical considerations that are associated with the AI-driven dietary solutions of FitBrokoli. The overarching goal is to assess users' concerns and engagements regarding bias, privacy and reliability, provide insights on the values by design principle, and propose solutions within the focus of RRI.

Theory

As mentioned in the introduction part, we are going to use the Responsible Research and Innovation (RRI) approach. Precisely, we will be focusing on four key dimensions of RRI, which are anticipation, reflexivity, inclusion, and responsiveness [2]. Anticipation is generally about the analysis of the possible risks, social and ethical issues of the technology or the service [3]. Considering the risks and concerns regarding the usage of AI, anticipation is quite important for the RRI approach. Secondly, reflexivity, which can be defined as being able to reflect upon social and ethical impacts and values of the service. It allows for criticism of biases and unintended consequences [3]. Lastly, principles of inclusion and responsiveness, engaging diverse stakeholders and having consistent feedback to remain aligned with society are crucial in our context, since we are examining a company that continuously gets feedback from its users.

Background Research

About FitBrokoli

FitBrokoli is an online dietitian service company founded in 2020. According to their website, FitBrokoli is “the largest, most knowledgeable dietitian in Turkey and the world to provide the best service to tens of thousands of clients.”[4]. Authentic support is provided by dedicated dietitians, committed to fostering long-term relationships and guiding towards enduring healthy habits. Apart from dietitians, FitBrokoli integrates the use of AI into its service structure in order to provide more comprehensive support and guidance to its users. As the users continue to engage with FitBrokoli through online services, a deeper understanding is gained, allowing for more effective assistance in line with individual needs with the assistance of AI. Thanks to artificial intelligence and machine learning, FitBrokoli designs processes that enable dietitians to guide their users in the most accurate way [5]. The control and development of AI that is used in FitBrokoli is managed by the AI team in the company, which enables the company to handle all the data safely and more responsibly.

Industrialization of AI

“Artificial intelligence (AI) refers to systems that display intelligent behavior by analyzing their environment and taking actions – with some degree of autonomy – to achieve specific goals.”[6] Recent years have seen significant advancements in AI, holding the promise of substantial benefits for organizations that effectively utilize its capabilities. In recent years, with the development of ChatGPT-like technologies, AI has become an important tool that can answer societies’ needs and concerns. Thus, AI technologies have become a widely used tool in everyday life. This everyday usage of artificial intelligence has made it a desired concept in various sectors. For example, “The development of dietary systems using AI [...] may lead [...] a global network that will be able to [...] support and monitor the [...] supply of nutrients.” [7] quote shows us that the health and diet sector is considering the use of AI to innovate. One of the ways AI affects this sector is through the help of chatbots, which can contribute to their users’ health by encouraging them to increase their physical activities, eat healthily, and lose weight [8]. These can be helpful to users as this technology has the potential to deliver highly personalized health recommendations [9].

Risks of AI

As AI is becoming more widespread in the industry, the set of risks caused by its increasing complexity and autonomy is becoming more noticeable. One of these risks is the bias that might happen during AI development, which causes biased AI models[10].

Another major risk concerns privacy, which requires ensured data governance mechanisms and the use of high-quality, legitimately accessed data [11]. These risks must be accounted for when dealing with AI. The user is a key stakeholder in the AI landscape, as they face the potential consequences of biased models and privacy breaches firsthand. Thus, user engagement plays a pivotal role in addressing the risks associated with AI. [12]

Bias Issues

Bias is one of the major risks of AI. Significant concern revolves around fairness and bias for AI models. AI bias is defined as “a phenomenon that occurs when an algorithm produces results that are systemically prejudiced due to erroneous assumptions in the machine learning (ML) process.”[13] Bias in AI is a pressing concern that stems from various sources. At its core lies the reliance on training data, which, if skewed or reflective of societal prejudices, can lead AI systems to perpetuate and sometimes intensify these biases.

“Data and data sets are not objective; they are creations of human design.” [14] AI systems learn from these data sets that they're fed, and if this data contains biases -whether in terms of gender, race, or other factors- the resulting AI model will reflect the biases in the source data, leading to unfair or discriminatory decisions in multiple sectors, such as healthcare or predictive policing. [15]

The bias on AI is a very real concern that needs to be managed before the AI is safely usable. Unfortunately, bias is an inherent trait of artificial intelligence, and it is impossible to completely prevent it from happening. However, there are ways to manage bias in AI, and managing the bias is much more approachable and doable. [16] Some methods for bias mitigation are vetting training data, monitoring production data, creating supportive processes, and quantifying feedback loops. [17] Furthermore, the training data can be processed in a way that would be fair “which ensures that a model’s decisions are the same in a counterfactual world where attributes deemed sensitive, such as race, gender, or sexual orientation, were changed.”

[18] In summary, bias is an internal part of AI that may cause significant problems in the model's performance and should be mitigated as best as possible to ensure the best performance.

In the health and diet sector, the use of AI is increasing rapidly. As it is one of the most sensitive topics for people, biases about race, gender, and age in AI are extremely undesirable and can potentially cause major health problems. However, data-driven, algorithmic, and human-caused biases in AI still occur and may cause misdiagnosing of certain patient groups, like gender and ethnic minorities. [19] These undesirable biases must be mitigated as best as possible with the previously mentioned methods before any AI model is used in this sector.

Privacy Issues

Privacy issues continue to be one of people's biggest concerns about AI technologies. AI systems are fed from the data they receive from users and they store this data for processing. [20] However, the fact that AI has a large amount of information about users creates the risk of privacy violations. [21] One of the most notable of these risks is in the field of health. AI is used increasingly in healthcare, especially in the field of healthy diet. [22] Yet, the application of AI in healthy diets also brings a problem regarding data privacy. [23] The data collected from the patients for the purpose of using artificial intelligence poses a risk. For example, a case was described in which 1.6 million health records were shared (without patient consent) with Google in the UK national health service to feed artificial intelligence models. [24] Another problem is that patients were not adequately informed when they were sharing their data. For instance, in the 100,000 Genomes Project, which aims to analyze the entire genome sequences of patients with rare diseases or cancer, the patients gave their consent, but did not realize the complexity of the project and it resulted in conflicts regarding patients not being informed thoroughly. [25] Another example related to the complexities about data privacy is the Chinese Government's approach. The Chinese government is also using advanced AI technologies in its healthcare system and huge amounts of personal data are being collected from various sources and added to AI algorithms for medical purposes, creating challenges to patient privacy. [26] These privacy issues in healthcare may manifest themselves in the field of healthy dieting. [27] So, considering these examples, AI has the potential to improve clinical nutrition and healthy dieting, but the integration of AI into clinical practice must be

carefully monitored to ensure patient safety. Also, new regulations should emphasize patient participation and consent and promote solutions for data anonymization and protection.[28]

Reliability in Healthcare

In recent years AI has advanced rapidly in almost every industry. This improvement can be promising in the field of healthcare. However, the recommendations generated by AI systems are not always reliable which raises questions on the effectiveness of AI in this field. [29] There may be several reasons behind these reliability issues such as AI simply being inadequate, biases in the dataset and privacy concerns. [30] Several regulations have been designated for the possible solutions to such concerns. One of the best examples for this is the British Standards Institution's validation framework for the use of AI within healthcare which details the evidence required by innovators to validate their AI systems in the field of healthcare. [31] The purpose of these regulations is to build trust in AI in the long run.

Method

In the initial stages of the project, we decided to find an area that is parallel with our interests, controversial in terms of AI usage, and open to development. For these reasons, after discussing different companies from different areas, we decided to conduct our research on FitBrokoli. Also, a member of our group had a connection with the executives at the company, which was beneficial for us in the interviewing stage. After choosing our interviewees and the interview dates, we prepared some questions related to AI use in the company. For our first two interviews, we interviewed the AI Systems Manager and a Big Data Manager from the company. For the last interview, we decided to take a different approach and interviewed a highly-valued user of the company, to gather data from both the executive and the client perspective. After gathering data from various perspectives, we transcribed the interviews with the help of translation tools and coded the interviews with QDA MinerLite to analyze the interviews in detail. Then, we highlighted the concepts that are related to the controversies and opinions regarding the usage of AI. Lastly, we performed follow-up research from various articles with the help of the data we acquired from the interviews.

Findings

Technology

As mentioned in the introduction, FitBrokoli is a company that provides an online dietitian service to its users with the help of one of today’s most popular technologies - AI. FitBrokoli uses AI as a helper to dietitians in terms of recommendation related issues and evaluation of feedback of users. As the nature of the AI systems, they use a huge dataset in order to create accurate recommendations. However, this property leads to some problems such as bias, data privacy & security and reliability. These issues will be inspected in the following sections.

By implementing AI into their systems, FitBrokoli aims to enhance user satisfaction and provide a cheaper and thus, reachable service by many. The table below shows the views of employees and users about the technology FitBrokoli uses and their predictions about its future through quotes.

Table 1

Usage of AI in FitBrokoli	“AI helps us by reminding about aspects that a dietitian might overlook, giving alerts, and offering advice on client feedback. It enhances the operational performance of dietitians. [...] We bring AI forward to suggest responses or reminders to clients in a more personalized manner, but the dietitian handles feedback based on their expertise.” (Big Data Manager) “[...] making dietitian services more widely available. To achieve this, we use AI in various areas that might pose challenges to the daily operations of dietitians.”(AI Systems Manager) “Although the usage of AI is not quite apparent to the users, I find FitBrokoli's approach quite innovative . I have never encountered such a service. The use of AI mixed with human input has made the dieting process more dynamic and convenient.” (User)
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Future of AI Systems	<p>“It’s a rapidly advancing field, and keeping up with new technologies is challenging. [...] As the use of artificial intelligence expands, it can assist in almost every field. Using it for data analysis can create benefits for almost every profession, and seeing it as a consultant or assistant is very practical. Therefore, I believe this technology will become much more widespread in the coming years.” (AI Systems Manager)</p>
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Bias

As mentioned above, even though AI offers great convenience in many fields, it also possesses great risks. Since the nature of AI systems contain huge datasets, wherever AI is used contains issues about bias as AI Systems Manager states: “The thing that we call "bias" is a fundamental risk that affects almost every AI application.” However, we know that the AI is as biased as its dataset which is created by humans. Although biases are mostly considered to be negative, AI systems might also be helpful in terms of spreading positive biases.

Table 2

Bias Issues due to AI	<p>“ [...] considering that a dietitian's role is solely managed by AI, where I'm only conversing with an AI for all recommendations, advice, and diet plans, poses certain risks. We risk making biased decisions based on the data we trained the AI on or providing incorrect or unhealthy recommendations. As health is involved here, there are serious risks.”(Big Data Manager)</p> <p>“In our field, bias tends to be more seasonal. For example, dietary recommendations change with the seasons.”(AI Systems Manager)</p>
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User's View on AI Being Biased	<p>“In my limited time using the application, I haven't noticed any issues relating to discrimination or bias. I think a big reason for this might be that AI is not used for everything, and there is still human input involved in the decision process.”(User)</p>
Solutions for Biased AI	<p>“[...] various measures, such as normalization and balancing the data sample set, are taken.”(AI Systems Manager)</p> <p>“Generally, since most of our metrics are learned from data, our goal in many applications is to make the data more balanced [...] ”(AI Systems Manager)</p>
The Upside of AI on Bias	<p>“if there is a bias from dietitians, standardizing them can be used to solve these biases. Using a separate model to determine whether there is bias is also a process that can be implemented. For example, we found an interesting thing in our dietitian performance surveys: a dietitian performed much better than other dietitians when dealing with clients who consume a lot of cigarettes and alcohol. Discovering the positive biases of dietitians and sharing this information with others is a practical application we use and aim for.”(AI Systems Manager)</p>

Data Privacy

Since FitBrokoli's service is based on AI systems, they require personal data from the user to operate more accurately. This data usually contains sensitive information, as Big Data Manager says: “The information we gather is indeed personal and sensitive, not just height and weight but also, for example, blood tests, menstrual cycles, and other health-related information”. Therefore, data privacy is quite crucial from the users' and the company's standpoint.

Moreover, by trying to handle a vast dataset, FitBrokoli also faces the potential risk of data leakage, which may have severe consequences for both the company and its users. The table below shows FitBrokoli's attitude towards these issues and the user's experiences and views regarding data privacy.

Table 3

<p>How does FitBrokoli collect data?</p>	<p>“Our main data sources include records from one-on-one appointments made by dietitians and phone logs. The service we provide operates through WhatsApp messaging, and we analyze the messages in this WhatsApp stream. Additionally, we collect various data during our registration process, such as information about employees' work lives and daily routines through surveys.”(AI Systems Manager)</p>
<p>Data Privacy Issues</p>	<p>“The biggest risk is the potential leakage of data. We know a lot about our clients' lives since we are a daily messaging contact for them. The interception of these conversations or the misuse of the insights we gain from them is a significant risk. Handling and storing this data securely are crucial aspects we pay attention to.” (AI Systems Manager)</p>
<p>User's View on Data Privacy</p>	<p>“[...] there are some cases where I think the privacy can be improved. Firstly, using a separate tool, which is WhatsApp, to communicate with the dietitians does not feel professional, and I cannot be sure about the safety of the data I am sending during these communications.”(User)</p> <p>“About privacy, providing users with more power over their control of data and being more open about how the data is used can improve trust.”(User)</p>

<p>Solutions for Data Privacy Issues Incribed by FitBrokoli</p>	<p>“[...] we have developed areas over time concerning data storage. For files that are important for privacy, such as pharmacy or health records, rather than receiving PDFs via WhatsApp, we secure them more safely on our own platform.”(AI Systems Manager)</p> <p>“Anonymizing this information periodically or revoking consent whenever a client requests it during subscription cancellation is a standard practice for us.”(Big Data Manager)</p> <p>“... often anonymizing it over time. Besides, without a person's consent, we don't collect or use any information.”(Big Data Manager)</p>
<p>Regulations Regarding Data Privacy</p>	<p>“[...] as per the KVKK (Turkish Data Protection Law), we have explicit consent texts and various conditions in our membership section. [...] There are standard procedures in place, and the company's lawyers manage these aspects.” (Big Data Manager)</p>

Reliability

As mentioned before AI performs as successfully as it is trained. When it comes to training AI several issues like bias emerge as discussed in 5.2. When these kinds of issues are tried to be solved, the quality issues already present in the performance of the AI can get even worse.(see Table 4) This results in a reliability issue regarding the recommendations that the AI gives. In other words there is a trade off between the way of solving the bias issues and reliability on the system performance. However, bias being present in the system also causes reliability issues.(see Table 4) The table below indicates these issues, their possible solutions inscribed by Fitbrokoli and the view of the user.

Table 4

<p>Trade off between bias and reliability</p>	<p>To mitigate this(bias), various measures, such as normalization and balancing the data sample set, are taken. However, these measures can impact the performance of the generated model.(AI Systems Manager)</p>
<p>Reliability Issues regarding the recommendations generated by AI</p>	<p>“Another risk from our perspective is the quality of our recommendations. [...] This is a risk related to whether the models we build serve their purpose.”(AI Systems Manager) “[...] considering that a dietitian's role is solely managed by AI, where I'm only conversing with an AI for all recommendations, advice, and diet plans, poses certain risks. We risk making biased decisions based on the data we trained the AI on or providing incorrect or unhealthy recommendations.”(Big Data Manager)</p>
<p>User’s View on Reliability of AI</p>	<p>“[...] I would not feel as comfortable as I feel now, knowing that the AI is supervised by the dietitian if there were no such supervision.”(User)</p>
<p>Solutions for Reliability Issues Inscribed by FitBrokoli</p>	<p>“However, we eliminate this risk automatically since all recommendations are still filtered through dietitians, who maintain control regardless. We have serious measures in place for people's health.” (Big Data Manager)</p>

User Design

User engagement is an important concept in the field of Responsible Innovation. In FitBrokoli, the design of the service system can be updated or improved by the user feedback. This approach helps the company to satisfy the needs or wants of the users and may prevent future risks that users may find problematic. By doing so, FitBrokoli achieves a more user based design structure. Thus, FitBrokoli enhances their value and provides a better and safer service environment for its users.

Table 5

Feedback Usage	<p>“Feedback surveys are automatically presented to our customers during the subscription process. It enhances the user experience by monitoring both dietitian performance and giving the client a sense of being tracked.”(AI Systems Manager)</p> <p>“Concerning improvements based on feedback, our general approach is what's known as AGILE, a working method used by many companies today, particularly since we consider ourselves a technology product. Our tech team operates in two-week sprints. ... Based on these feedback loops, we make improvements. Our approach is to quickly implement something and then incrementally develop it further, like version 2 or version 3.”(Big Data Manager)</p>
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Analysis and Conclusion

FitBrokoli is an AI based online service company that offers its users a wide range of healthcare and wellness recommendations with the help of dietitians. Through the analysis of the findings from the perspective of RRI we have found that FitBrokoli faces some issues regarding the social, ethical and technical risks of their AI system. The aim of the company is to give the best possible experience to users while keeping their values at the center of their mission and vision. As the big data manager of the company states “It's our responsibility to use this data ethically, safeguard it properly, and utilize it correctly.” This emphasizes the effort that the company puts into acknowledging the social aspects of the system they have created. This acknowledgment provides the opportunity to anticipate any risks that can occur in the future. Moreover, with the help of the interviews conducted with the managers of the company, we have observed that Fitbrokoli already has some possible solutions to the risks arising in this field such as: biased AI, data privacy and reliability which are shown in the findings part. Although Fitbrokoli incorporates RRI concepts into their work there can still be various improvements on their service structure.

FitBrokoli puts great effort on the detection, elimination and prevention of the possible bias issues that come with the necessary usage of AI. (see table 2) They use some techniques to eliminate seasonal biases that occur in their data. Through normalization and balancing FitBrokoli enables its AI to operate in a less prejudiced manner. The manipulation of the data in order to prevent bias results in some unintentional performance issues.(see Table 4) This results in a trade off between reliability of their AI performance and the eradication of the bias in their system. By continuously monitoring and trying to maintain a balance in this trade off, FitBrokoli demonstrates a reflexive approach which is one of the key dimensions of RRI as mentioned in the theory part. Although bias is considered to be negative in most cases, because of the reflexive methods the company uses, they realized some positive bias shown by dietitians by performing better on particular cases and turned it into their advantage.(see Table 2)

As mentioned above, reliability is a key concept for FitBrokoli since it is concerned with health related problems. For a highly sensitive topic such as healthcare providing the user with misinformation could have catastrophic results. Thus the performance of the AI system must be immaculate. Currently AI systems seem to be far from perfect as can be understood from the background information. Therefore, FitBrokoli includes professional dietitians into their service structure that acts as a control mechanism for the

recommendations generated by the AI just as the interviewed user and probably other users would prefer.(see Table 4)

When it comes to privacy issues related with data management, FitBrokoli is highly aware of the necessity to create a safe environment for the user. (see Table 3) As the big data manager of the company clearly states: “It's sensitive, and we are conscious of this sensitivity, taking necessary precautions.” Furthermore, there are several regulations that the company must obey both from within their own organizational policies and government such as KVKK.(see Table 3) In order to create this safe environment, one of the main things FitBrokoli does is to gather and manage highly confidential information, especially about the user's health issues, in their own private system. However, most of the conversation between dietitians and users are over WhatsApp which creates trust problems according to the user. In addition, FitBrokoli incorporates the concept of privacy by design into their system. The gathered information is anonymized periodically to ensure safety which is an essential point of privacy by design. Although FitBrokoli has a consent form that the user must sign to register, from the interview the user complains about the extent that a user has control over his/her data. In order to solve this issue, informed consent concept can be implemented into the service.

Since FitBrokoli is as big and valuable as its number of users, they centralize the needs and wants of its highly valued users. Thus, for FitBrokoli implementing a user based design is crucial. As the managers of FitBrokoli repeatedly emphasized the importance of user feedback, inclusion of the users in the design and innovation stages is constantly present.(see table 5) Furthermore, inscribing the user opinions into the system through AGILE sprints demonstrates the company's effort to be responsive.

After inspecting FitBrokoli's approach to social, ethical and technical risks through the lens of RRI and combining our findings with the background research, we can conclude that FitBrokoli is satisfying all four key dimensions of RRI. They are trying to successfully implement solutions(privacy by design, anonymization of data, etc.) to possible bias, data privacy and reliability risks arising from the usage of AI. However, there is still room for improvement in terms of handling these risks and FitBrokoli relies on the feedback given by its customers in order to do so. In conclusion, FitBrokoli uses RRI concepts to create a user-friendly and safe environment for its highly valued users and according to the interview done with a user, they can be considered successful.

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Appendix

Interview 1 (AI System Manager):

G: Can you tell us about the AI technology you use or develop in general?

H: We at FitBrokoli are a technology company providing dietitian services to our clients. These clients can be companies purchasing dietitian services for all their employees or individuals subscribing to one-on-one dietitian services on a monthly basis. Our role as a technology company is to make these dietitians accessible to more people, essentially making dietitian services more widely available. To achieve this, we use AI in various areas that might pose challenges to the daily operations of dietitians. For example, using AI in analyzing messages on platforms like Instagram, where a dietitian may be communicating with 50 clients, aims to increase this number while maintaining service quality.

G: In which parts of these applications is AI present?

H: Our main data sources include records from one-on-one appointments made by dietitians and phone logs. The service we provide operates through WhatsApp messaging, and we analyze the messages in this WhatsApp stream. Additionally, we collect various data during our registration process, such as information about employees' work lives and daily routines through surveys. Using this data, we try to design specific experiences for clients. For dietitians, we aim to facilitate certain actions, and we achieve this through the system. On the machine learning side, our work spans a wide range, including classifying what images are related to, examining the content of messages, and identifying situations that require special attention when, for instance, the conversation is about a specific health issue. We work on text, image, and speech processing.

G: What are the social risks that this technology may cause?

H: The biggest risk is the potential leakage of data. We know a lot about our clients' lives since we are a daily messaging contact for them. The interception of these conversations or the misuse of the insights we gain from them is a significant risk. Handling and storing this

data securely are crucial aspects we pay attention to. Another risk from our perspective is the quality of our recommendations. When we make a recommendation, the aim is to suggest an effective action for the dietitian and advance the situation. If this doesn't happen, we could become a burden to the dietitian. This is a risk related to whether the models we build serve their purpose.

G: Could this technology create a privileged situation for a specific group?

H: The thing that we call "bias" is a fundamental risk that affects almost every AI application. To mitigate this, various measures, such as normalization and balancing the data sample set, are taken. However, these measures can impact the performance of the generated model. In our field, bias tends to be more seasonal. For example, dietary recommendations change with the seasons. We try to overcome biases related to time or the source of the client's data through normalizations and balancing samples.

G: What is being developed or planned in response to user feedback regarding risks?

H: Speaking on a case-by-case basis would be more accurate. Generally, since most of our metrics are learned from data, our goal in many applications is to make the data more balanced. We have ongoing work in areas where we make predictions and improve practices. For instance, in terms of feedback, we have developed areas over time concerning data storage. For files that are important for privacy, such as pharmacy or health records, rather than receiving PDFs via WhatsApp, we secure them more safely on our own platform.

G: Do you have regular user satisfaction and suspicion analysis?

H: This is beneficial for us. It enhances the user experience by monitoring both dietitian performance and giving the client a sense of being tracked. Feedback surveys are automatically presented to our customers during the subscription process.

G: One more thing to add, we looked at the problematic issues from a social perspective earlier, but could there be problems for employees?

H: Our models can cause bias, and if there is a bias from dietitians, standardizing them can be used to solve these biases. Using a separate model to determine whether there is bias is also a process that can be implemented. For example, we found an interesting thing in our dietitian performance surveys: a dietitian performed much better than other dietitians when dealing with clients who consume a lot of cigarettes and alcohol. Discovering the positive biases of dietitians and sharing this information with others is a practical application we use and aim for.

G: How do you foresee the direction of the technology you use?

H: It's a rapidly advancing field, and keeping up with new technologies is challenging. Especially with ChatGPT, a risk of dependency on third parties has emerged. This is because a model you create cannot compete with an enterprise-level model that serves its purpose in any way. And when you look at the marginal cost, using that model becomes more efficient. There is a serious risk for an organization to become dependent on a third party in the AI world. But practically, I don't think this will happen because competition is very fast, and similar models emerge right after. I expect such a development. As the use of artificial intelligence expands, it can assist in almost every field. Using it for data analysis can create benefits for almost every profession, and seeing it as a consultant or assistant is very practical. Therefore, I believe this technology will become much more widespread in the coming years.

Interview 2 (Big Data Manager):

G: Alright, then I'll start.

K: Okay.

G: Can you tell us in general about the technology you use or have developed?

K: Alright, but do I need to be in the context of artificial intelligence?

G: Yes, exactly.

K: As FitBrokoli, we actually provide an online dietitian service. We don't have a product; we have a service. Normally, dietitians would interact with clients face-to-face, periodically meet them physically, measure their weight, monitor their adherence to the diet plan, and so on. We provide this service to clients online through WhatsApp, maintaining communication 24/7, and conduct appointments through monthly phone calls. Essentially, we offer a standard dietitian service to clients, but in our business model, we can handle far more clients than a regular dietitian due to the online setup. With the support of artificial intelligence, we scale this process. AI helps us by reminding about aspects that a dietitian might overlook, giving alerts, and offering advice on client feedback. It enhances the operational performance of dietitians. On the other hand, since our aim is to enhance client satisfaction and improve their experience, in the realm of personalization where AI lags, we leave some initiative and responsibility to the dietitian. We bring AI forward to suggest responses or reminders to clients in a more personalized manner, but the dietitian handles feedback based on their expertise. Moreover, people generally don't prefer overly robotic interactions in these kinds of relationships. For example, when calling a bank, pressing buttons, or talking to a bot isn't appealing. But there's a handicap in AI as well. It's more like a collaboration, utilizing the strengths of both sides. If I'm digressing too much, I can summarize it later, but there are more advanced applications in this field. Maybe there could be futuristic aspects, but currently, they remain more in the realm of imagination.

G: Let me move to another question. You mentioned clients. Should these clients always be regular individuals, or are there different types of users?

K: Our clients are always real people. There's nothing different in that aspect.

G: Mister AI Systems Manager mentioned that you work with some companies and provide services to them, but...

K: Well, there are corporate collaborations where we work as a company. We still work with real people, but our business model changes in two ways. We operate in both B2B (Business to Business) and B2C (Business to Customer) models. In B2C, individuals directly purchase subscriptions from us. They visit Fit Broker's website, buy a subscription, pay for it, and start using it. That's a direct B2C approach. On the other hand, we can make corporate deals with companies like Arçelik, Ford, Otosan, etc. We directly engage with these companies. We

become part of the benefits package offered by these companies. We make agreements with the companies, and they offer Fit Broccoli as a benefit to their employees. As they use our service, we don't bill the employees; instead, we directly invoice the company. Nevertheless, they are still real individuals. There's no difference in how we handle them.

G: What potential risks could arise from using these technologies, like AI or receiving messages via WhatsApp, in terms of social risks?

K: I can address that as well. Allowing this to be unchecked, or, for instance, considering that a dietitian's role is solely managed by AI, where I'm only conversing with an AI for all recommendations, advice, and diet plans, poses certain risks. We risk making biased decisions based on the data we trained the AI on or providing incorrect or unhealthy recommendations. As health is involved here, there are serious risks. However, we eliminate this risk automatically since all recommendations are still filtered through dietitians, who maintain control regardless. We have serious measures in place for people's health. For instance, we don't provide assistance to individuals with specific BMI thresholds without a signed document from their doctor, or for specific health conditions like Type 1 diabetes, we don't provide direct assistance; instead, we direct them to doctors and assist in the follow-up and motivation process.

G: How about the potential issues related to data protection?

K: Data protection concerns are something every company collecting information from individuals, customers, or clients seriously considers, as per the KVKK (Turkish Data Protection Law). We have explicit consent texts and various conditions in our membership section. It's our responsibility to use this data ethically, safeguard it properly, and utilize it correctly, often anonymizing it over time. Besides, without a person's consent, we don't collect or use any information. There are standard procedures in place, and the company's lawyers manage these aspects. The information we gather is indeed personal and sensitive, not just height and weight but also, for example, blood tests, menstrual cycles, and other health-related information. It's sensitive, and we are conscious of this sensitivity, taking necessary precautions. Anonymizing this information periodically or revoking consent whenever a client requests it during subscription cancellation is a standard practice for us.

G: For instance, based on the feedback you receive, what improvements do you make using these technologies? For instance, you mentioned bias; what are your thoughts on AI training to prevent that?

K: What do we do to prevent bias? Concerning improvements based on feedback, our general approach is what's known as AGILE, a working method used by many companies today, particularly since we consider ourselves a technology product. Our tech team operates in two-week sprints. For instance, when a client arrives, they get paired with a dietitian, start chatting on WhatsApp, share their meals, and within the first week, they have a phone appointment with their dietitian. Before this appointment, we gather essential information about the client—sleep patterns, wake-up routines, daily exercise routines, preferred and disliked foods—to confirm and incorporate these details into the diet plan during the appointment. After the initial appointment, we collect feedback from the client. Then, on the 21st day, we collect another round of feedback. If, for any reason, they are dissatisfied and cancel their subscription, we gather feedback after the cancellation. Based on these feedback loops, we make improvements. Our approach is to quickly implement something and then incrementally develop it further, like version 2 or version 3. At the moment, I can't recall a specific improvement we made based on client feedback.

G: That's probably sufficient. Lastly, you previously mentioned a bit about where you foresee the technology you use heading.

K: When it comes to that, it feels like almost anything I say might be relevant. It feels like making a prediction, even if it doesn't turn out to be true. There are indeed so many different aspects to this topic. For instance, I used to work at an airline company called Sun Express. There, I often pondered whether AI might take over piloting in the future. You know, technically operating something and making decisions based on specific situations. In essence, this could be something that could be left to an algorithm or artificial intelligence. Maybe in 5 years, 10 years, or even 20 years, I don't know. But in terms of human psychology, would someone who's about to board a plane want it to be flown by AI? Would tickets be sold for that? Who would be responsible if any issues arise? When Tesla had accidents, who was held accountable? There are ethical debates around autonomous vehicles – when one crashes, who is at fault and who isn't. There are so many different possibilities that I myself am not entirely sure about where this might lead. For instance, I remember a

study discussing whether governments, after AI takes over many tasks, could still provide income to people who don't work. Not necessarily in our country, but in countries more advanced than ours, discussions like these take place. While it doesn't seem very realistic to me, it's a topic I'm genuinely curious about.

This is a hot topic, one that will receive considerable investment and development. I also recall, maybe a bit off-topic, something I watched somewhere this year, perhaps at a TED Talks. A prototype was being presented by a famous, I think, individual... I can't recall their name, but they had worked at a well-known phone manufacturer, like iPhone or Samsung. They were introducing a prototype of a phone that was entirely AI-driven. It had this camera-like thing that you could slip into your pocket. There was no screen, no typical display. Somehow, it projected something like a projection into your hand. So, there wasn't a direct screen, but when a call came in, it projected something onto your hand. It was like a real phone screen – there were options to answer or decline, buttons and all. But fundamentally, there wasn't a physical screen. Instead, it constantly monitored your surroundings, listened, perceived, and it was an AI-powered phone. It sounded quite futuristic to me, but I don't know if it's feasible or not. It doesn't seem like we'll detach ourselves from screens anytime soon. I spend about ninety percent of my waking hours in front of a screen, whether working or during my personal time. So, it feels quite different to me. It was an angle I hadn't looked at before, an approach I hadn't encountered. Whether it will hold or not, I'm not sure, but I find such intriguing concepts enjoyable and thrilling.

In that scenario, the person was actually having a conversation on the phone. They had gone in and out of meetings that day. When summarizing the day, it could say something like, 'You have a meeting about this tomorrow, this meeting has been rescheduled for that time, this happened in this way, that happened in that way.' It seemed to know a lot, like a summary of everything, including messages received, emails, and meetings. I'm not sure how real the prototype was, but after the meeting, I'll try to find the link and share it. For instance, I found it intriguing. Later on, there was a movie, like 'Her,' I think. It was about a man who falls in love with a voice assistant similar to Siri. Though it seems surreal, it feels like some of these might actually happen in the near future, like it's a prediction from 'The Simpsons.' But I can't definitively say if it will go this way or that way, whether it will save or ruin our lives, but I'm eagerly anticipating it, absolutely.

G: Alright, then we've completed the questions. Would you like to add anything else?

K: I think I've addressed the essential aspects. If there are any further questions or if you need any clarification, feel free to ask.

G: Perfect, then we'll consider this the end of the interview. Thank you for your time.

K: You're welcome. Thank you.

Interview 3 (User):

G: What do you think about FitBrokoli's approach as an online dietitian service that uses AI? Can you describe generally your experiences using the application?

N: Although the usage of AI is not quite apparent to the users, I find FitBrokoli's approach quite innovative. I have never encountered such a service. The use of AI mixed with human input has made the dieting process more dynamic and convenient. It makes recommendations based on my preferences and dietary needs, making it easier for me to stick to a healthier lifestyle. Thus, I can say that my experience has been positive. The application is user-friendly, and the daily interactions with the dietitian make the process feel more special. I think it is a useful service for diet purposes.

G: Do you think this would be something that would interest others?

N: Why not? Personally, I liked using it and it was a different experience for me since I have never seen it anywhere else before. It provided a faster, and more convenient service than going to the dietitians' office. I think many people could benefit from this technology.

G: What do you think about the possible privacy issues that may be present in the application?

N: Privacy is one of the main topics I consider before I use an application. I can say that I am happy with FitBrokoli's approach to privacy in general. However, there are some cases where I think the privacy can be improved. FitBrokoli using a separate tool, which is WhatsApp, to communicate with the dietitians does not feel professional, and I cannot be sure about the safety of the data I am sending during these communications. I would appreciate a more transparent system, which would feel a lot more privacy-focused for the communication.

G: What do you think about the possible bias or discrimination issues that may be present in the application?

N: As for discrimination concerns, it's an essential topic in today's society. In my limited time using the application, I haven't noticed any issues relating to discrimination or bias. I think a big reason for this might be that AI is not used for everything, and there is still human input involved in the decision process.

G: But the recommendations you get from the AI are mostly sensitive and important topics like healthcare and wellness. Are you willing to rely on the recommendations of AI in these sensitive subjects?

N: As I said earlier, I would not feel as comfortable as I feel now, knowing that the AI is supervised by the dietitian if there were no such supervision.

G: What can the company adjust to mitigate the risks?

N: I don't have much information related to the technical side of things. Regarding privacy, providing users with more power over their control of data and being more open about how it is used can improve trust. Also, I thought the surveys about the user experience were a good way to detect any problem.

G: Lastly, what do you think about the future of Artificial Intelligence?

N: I think it will improve drastically, considering the recent innovations that have been happening in recent years. As a medical student myself, the improvements in AI technology promise great things. It will be a really helpful tool. However, if it improves too much at this rate, I might be studying in vain.

G: Thank you for sharing your thoughts and experiences with us!

Credits

Initially, the workload for gathering data from the interviews were distributed among group members.

Göksun Ural Çamurdan: Interviewed AI Systems Manager and Big Data Manager and participated in coding the interviews.

Ege Karaahmetoğlu: Interviewed AI Systems Manager and the user, participated in transcribing the recordings. Helped in coding the interviews.

Kaan Türkoğlu: Interviewed Big Data Manager and transcribed the recording. Helped coding.

Ayberk Berat Eroğlu: Transcribed the interview of the AI Systems Manager, interviewed the user and helped in finding the key concepts in those interviews.

Mirza Özgür Atalar: Participated in coding interviews.

After gathering data and coding, each member of the group participated in the final report equally, everyone contributed in background research and findings to the same extent.