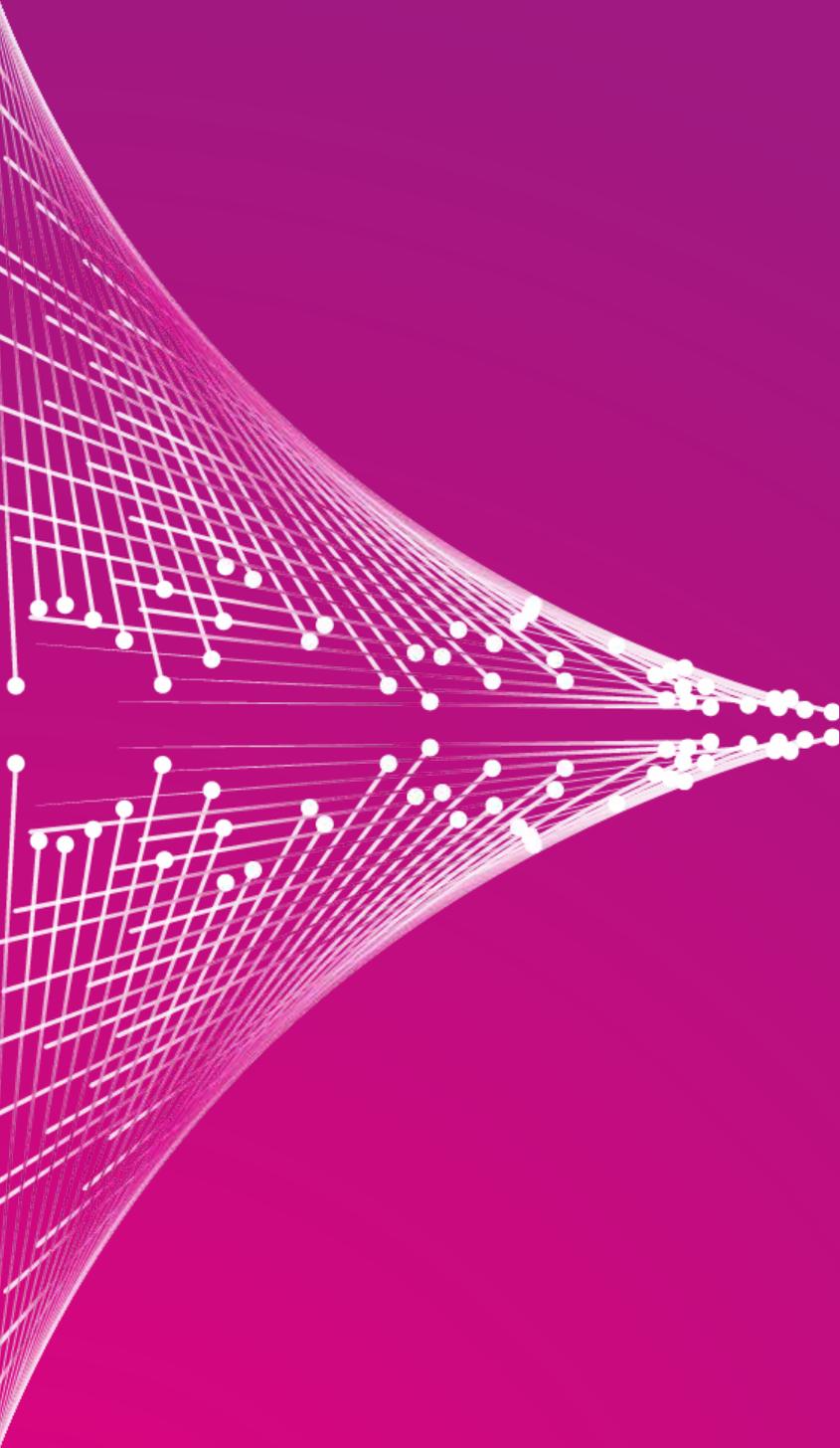




Responsible
Artificial Intelligence
for Public Employment Services



**Software
that matters**



WCC has
proven to be
a trusted
partner

Introduction

Artificial Intelligence (AI) is the practice of making machines exhibit human-like intelligence. Typical tasks that AI algorithms can perform in order to support human decision-making processes include prediction, classification, and the identification of trends, patterns, and outliers. A common way for AI algorithms to perform such tasks is through automated reasoning, i.e., the application of rules and logic. Another well-known staple in the AI toolbox is the automated identification of patterns in data through statistical analysis, i.e., machine learning.

In recent years, AI has evolved into a mainstream commodity. Today, AI algorithms are widely available, and there is little to prevent a reasonably technical person from applying an algorithm to an arbitrary set of data, and unleashing the resulting model upon the real world. The commoditization of AI has the potential to be a great catalyst for innovation, provided that we accept social and ethical responsibility when leveraging the power of AI in real-world applications. Assuming this responsibility is a critical success factor for AI-based innovation – especially in the public domain, where AI applications have the potential to affect the lives of millions of people.

With today's increasingly complex, powerful, and impactful real-world applications, it is more important than ever for AI algorithms to be transparent and controllable. The recently proposed regulations from the European Union around the use of AI, specifically in high-impact use cases like job matching and workforce development, further highlight the urgency of exploring how AI can support these core tasks of public employment services in a responsible way.

The key to responsible use of AI lies in understanding what types of algorithms to apply, how to apply them, to what kind of data, and under which circumstances this is appropriate.

In the past decades, WCC has proven to be a trusted partner to public employment services around the world, enabling them to responsibly support their core processes with WCC's reliable, transparent, and controllable AI-powered products. WCC is committed to leveraging this experience and expertise in order to continue to empower public employment services to bring their job matching and workforce development efforts to the next level through responsible use of AI – today and in the future.

Challenges for Public Employment Services

Public employment services have a responsibility towards society and their other stakeholders. This responsibility presents various challenges. AI algorithms should acknowledge and properly deal with these challenges in order for AI algorithms to perform as required in the real world of public employment services. The biggest challenges for public employment services include the following:

1. Explainability of recommendations

Public employment services must be able to explain why they do or do not recommend particular vacancies to job seekers. This is especially important when job seekers have an obligation to apply to some of the recommended vacancies. When public employment services use AI to support making recommendations to job seekers, it is of paramount importance that the underlying algorithms are explainable and controllable.

2. Tracking trends in an ever-changing labor market

Public employment services need to identify current and emerging gaps in the labor market, in order to develop appropriate support measures that will address these gaps. Labor market insights, driven by (real-time) analytics on labor market data, are crucial enablers for such workforce development functionalities.

3. Bias and inequality

One of the most important tasks of a public employment service is to reduce inequality by helping people with disparate labor market challenges to decrease their distance from the labor market. As such, the core applications of public employment services simply cannot have a structural bias that contributes to the presence or increase of inequality. If we were to simply use an arbitrary black-box, one-size-fits all machine-learning algorithm in job matching, we would run the risk of that algorithm inadvertently picking up on patterns of inequality in historical data, and propagating them in the future. This could lead to, for example, the resulting job matching models favoring certain socio-economic and socio-demographic characteristics over others.

The use of more transparent, tailored, and refined AI approaches can help address such issues.

Practical Challenges for Artificial Intelligence

In order to responsibly apply AI in real-world applications like job matching and workforce development, various technical and methodological challenges need to be addressed:

1. Data

A successful AI application requires sufficient amounts of relevant, appropriate, and representative data to be available. In the real world, data is highly likely to be incomplete, inconsistent, and incorrect. As such, special attention must be paid to the process of collecting, cleaning, and enriching the available data.

2. Algorithms

Today's AI toolbox offers a multitude of algorithms that can turn data into value. Each of these algorithms has its own strengths, weaknesses, and typical application scenarios. It is of crucial importance to select the most appropriate algorithm for the task, and to fine-tune it to work optimally with the available data. Depending on the selected algorithm, the resulting model can be hard to understand, and outcomes may at times be unexpected, inexplicable, or incorrect. This may be perfectly reasonable and acceptable in some situations, but it may become a real issue for end-user acceptance when a model displays erratic behavior in a seemingly trivial task, or in a critical, high-impact application.

3. Evaluation and presentation of results

To properly assess the performance or outcome of an AI algorithm, or to give insight into the analyzed data, appropriate metrics and visualizations are essential.

4. Dealing with change

Some types of AI algorithms can learn from the past, and extrapolate their findings to the future. However, real-world AI applications operate in agile environments. Over time, the more distant past may lose relevance.

It is of paramount importance for real-world AI applications to incorporate a feedback loop that allows them to adjust to changing circumstances by learning from new data.

5. Bias

Irregularities in the aforementioned challenges can result in a biased model. The selection, cleaning, and enrichment of data may be subject to human bias (e.g., confirmation bias), as well as the initial creation of the data itself (e.g., self-selection bias or incomplete data). Furthermore, the selection, fine-tuning, and evaluation of algorithms could also be influenced by human bias (e.g., confirmation bias). Another form of bias could be introduced by incorrectly using the resulting model in practice, for instance by misinterpreting its outcomes or by using the model out of the originally intended context. Yet another source of bias could be an inappropriate or incomplete feedback loop, for instance when evaluating a job matching algorithm based on whether or not a job seeker ended up being hired for a vacancy. This type of information is often incomplete, and could be susceptible to influence by human bias in job interviews, rather than reflecting that a vacancy or an anonymized CV was marked as interesting by a job seeker or employer, respectively. Responsible AI practices make a conscious effort to identify and mitigate these potential sources of bias.

Responsible Artificial Intelligence in WCC's Products

Rule-based, knowledge-driven forms of AI that keep the human in the loop form the core of WCC's answer to the challenges of public employment services. The additional benefit of using these forms of AI is that their nature allows WCC's products to address the technical and methodological challenges that come with responsible application of AI in the real world. WCC's products for public employment services have been built on the following principles:

1. Incorporation of domain knowledge

Taxonomies and ontologies form a central component of WCC's solutions for public employment services. These knowledge models allow public employment services to feed their own domain expertise into the mostly rule-based, knowledge-driven AI that powers WCC's solutions.

2. Controllability of data usage

WCC's solutions allow for full control over the exact data which is used in which defined circumstances.

3. Controllability of model usage

WCC's solutions address bias and inequality in labor markets by allowing full control over the logic used in the underlying match models. It is also possible to control how models are used for different users, and under which circumstances these rules apply.

4. Transparency

WCC's solutions provide full transparency as to the reasoning behind their outputs.

5. Monitoring

Analytics on data and system logs can be used to monitor WCC's solutions' performance and to spot trends and patterns that can be used to further optimize matching strategies, for instance for vulnerable groups.

6. User acceptance through engagement

End users will more easily accept systems if they feel that they understand and are in control of the underlying AI. WCC's solutions achieve this by engaging the user in the process. This pertains to, for example, data entry guidance, explaining the rationale behind personalized recommendations, and allowing a user to opt-in to increasingly complex match logic.

Responsible
use of AI –
today and in
the future



WCC's products are mainly driven by rule-based, knowledge-driven forms of AI. Nevertheless, data-driven, self-learning capabilities still have their place in WCC's products, and are used when appropriate. When we do use machine-learning algorithms, we strive for a responsible use of AI through the following principles:

1. Methodological rigor

Our data professionals are thorough and precise as they design, validate, and document an appropriate methodology and the outcomes, performance, applicability, and limitations of the resulting models.

2. Prioritization of explainability

We always strive to find the optimal balance between explainability and performance. We do this by selecting the most appropriate algorithm and optimizing its performance, subject to a desired level of explainability. On top of that, we use state-of-the-art techniques like Shapley analyses to give more insight into the logic learned by our machine-learning algorithms.

3. Diversity

The data professionals, product teams, and delivery teams working on the AI behind WCC's products have joined us from a wide range of backgrounds. The team's diversity enables them to look at a real-world application scenario from various perspectives. This is effective in reducing bias, and ensures that the final, implemented solutions ultimately benefit the equally diverse populations targeted by public employment services around the world.

Outlook

State-of-the-art AI offers many possibilities for public employment services to continue to innovate how they support core tasks like job matching and workforce development. However, with great power comes great responsibility. Therefore, WCC will continue to leverage decades' worth of experience and expertise in responsibly applying AI, to empower public employment services to bring the execution of their core tasks to the next level.

About WCC

A leading advanced solutions provider for Public & Private Employment Services and ID/Security government agencies. Built on its unique search & match platform, WCC software solutions see 1/3 billion people every day, enabling organizations to seamlessly capture, generate, and analyze big data from multiple sources gaining valuable insights paramount to effective decision-making.

Our team of professional services experts provides exceptional support and consulting, allowing our customers to maximize their investment.

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