



**Duty of care, artificial intelligence, and
gambling:
A scoping review of risk assessment models to
detect gambling harm**

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Introduction

- The online environment has become more and more present in our every day lives; this applies also to gambling activity.
- This gives the opportunity to track different kind of customer behaviour and metrics as everything done in online could be tracked to some extent.
- This also enables harm prevention and responsible gambling (RG) tools that were not possible to use/construct in the previous "analog" or land-based gambling world.
- However: Profit maximizing companies and regulators probably have quite opposite incentives regarding the use of AI and player account data, at least to some extent.



Why do different parties want to detect harmful gambling and why it is done with AI?

- Companies:

- Motives: 1) Help to optimize business functions and maximize revenues. 2) Fullfill the duty-of-care and RG requisites set by the regulators.
- Pros: 1) Automated screening and labelling of customers (also for e.g. marketing etc. purposes). 2) Implementation of duty of care: 'A black box' solution that 'just works'.
- Problems: 1) What is enough from the duty of care perspective? 2) Small portion of gamblers usually produce significant amount of all revenues, are the companies willing to 'give up' this part of revenues? 3) In a multi-licence system: Which company has the final responsibility to do the intervention?



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- Regulators:

- Motives: 1) Effective harm prevention and reduction. 2) Targeting interventions.
- Pros: 1) Easier to monitor companies' duty-of-care and RG responsibilities. 2) Allocate help and support services more efficiently.
- Problems: 1) How are the effectiveness of harm detection and the resulting duty of care actions evaluated (i.e. what is 'sufficient' from the companies side)? 2) In many cases, again, the models are more or less 'black boxes'. 3) How to obtain all the necessary data, especially in a multi-license system?



Current study

(Ristolainen, Marionneau & Roukka)

- This study was launched as a part of a project where it was investigated how the regulator could and should build an AI model to detect/forecast harmful gambling behaviour by using player account data.
- This scoping review was conducted to get a better view what kind of methods have been used in the previous studies to detect harmful gambling behaviour with using player account data.
- We focus on three critical stages of model development:
 - 1) the selection of the estimation data 2) the decisions related to the model estimation process and 3) the assessment of the prediction model and the interpretation of prediction results.



Methods

- We identified relevant studies by conducting a literature search in scientific databases (Scopus, Ebscohost, and Google Scholar).
- The search terms used across the databases were: ‘Gambling AND forecast OR machine learning OR account data OR artificial intelligence OR data science’.
- To capture also privately developed models or approaches taken by the gambling industry, we also extended the search to include leading gambling provider names and the term ‘responsible gambling software’. (separate analysis)
- The searches in the academic databases were conducted in English, but no restrictions were placed on the language of results.
- The grey literature searches on Google were conducted in English, French, German, Italian, Swedish, Norwegian, and Finnish.
- We included all results published between 2015 and March 2024 when searches were conducted.



Methods (cont.)

- During the abstract screening and full report reading phase, we applied the following exclusion criteria.
- We excluded:
 - (1) non-empirical discussion papers that did not include original data
 - (2) prior reviews
 - (3) reports that did not use statistical methods to model problematic gambling or harmful gambling behaviour
 - (4) theses produced by students
 - (5) papers focusing on video gaming rather than gambling.
- As a result, we have 28 research articles for the final reviewing process.



Main results (preliminary)

- We identified 14 distinct topics which are important in different stages of the model development and models effectiveness from the duty of care perspective.
- We found a great variation in the approaches to detect harmful gambling behaviour.
- Also some very fundamental concerns arised regarding the real-life performance and applicability of these models **for duty of care purposes**.

Table 1: Summary of main results (preliminary)

	No. of studies	% for which relevant
Funding from industry/private sector	17	TBA
Open access to data	5	
Open access to code	1	
Dependent variable from survey responses (PSGI etc.)	9	
Dependent variable self-exclusion	4	
Forecasting future gambling harm	9	
Hyperparameter tuning discussed	7	
Comparison across modelling frameworks	16	
Aggregation of data	28	
Data for a year or less	28	
Data for a single time period	25	
Unbalanced nature of data discussed	5	
Use of proper assessment criteria when the data is unbalanced	2	
Used unsupervised ML/clustering methods	9	

Conclusions (preliminary)

- The use of AI methods/models to detect harmful gambling still appear to be more or less 'a black box'.
- All the critical stages of model development should be more openly and clearly presented.
- Better assessment and interpretation of the models is needed (e.g. ROC AUC vs PR AUC).
- Models should have proactive and preceding approach and forecast behaviour/actions that can be accurately measured and pointed from the data. This means that survey based indicators are not probably the best way to go.
- Using just a one single measure from the transaction (or survey) data is not sufficient measure to capture all the dimensions and possible trajectories of gambling harms.





Thank you for listening!

Questions?

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