

DUNDALK INSTITUTE OF TECHNOLOGY
School of Informatics & Creative Arts
Ethical Approval Form for Research Projects

Researcher Name: ELTON GRIVITH D'SOUZA Year: 5 Course: MSc Data Analytics

Title of project: Pre-processing Techniques for Mitigation of Bias in Machine Learning

Name of supervisor/s: Natalia Budarina
(if applicable)

Date: 15 APRIL 2024

This application is to be completed by the researcher and where appropriate, in conjunction with the project supervisor. The lead researcher/supervisor is responsible for submitting the completed form to the appropriate Research Ethics Committee (details below)

Please note: If your submission is incomplete or unclear, your application will be returned to you and your project may be delayed.

Section 1

Type of Researcher

Please tick the appropriate box below to indicate the type of researcher you are:

Undergraduate
(proceed to section 2)

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Completed Ethical Approval forms for undergraduate research should be submitted to the relevant Departmental Research Ethics Committee (DREC).

Drec.dcammm@dkit.ie – Department of Creative Arts Media and Music

Drec.dcsdm@dkit.ie – Department of Computing Science and Mathematics

Drec.dvhcc@dkit.ie – Department of Visual and Human Centred Computing

Postgraduate
(proceed to section 3)

☒

Completed Ethical Approval forms for Postgraduate research should be submitted directly to the School Research Ethics Committee (SREC).

Srec.ica@dkit.ie

Staff
(proceed to section 3)

☐

Completed Ethical Approval forms for Staff research should be submitted directly to the School Research Ethics Committee (SREC).

Srec.ica@dkit.ie

Section 2

Please complete questions 1-4 listed below.

	Human and / or Animal Research	YES	NO
1	<p>Does your research involve human participants other than the following¹?</p> <ul style="list-style-type: none"> • Research using exclusively secondary sources. • Research using materials legally accessible to the public that have legal protection, e.g., record of court judgements, data archives. • Research using materials that are publicly accessible and where there is no reasonable expectation for privacy, e.g., books, published third party interviews. • Observations of human behaviour in public where (i) those being observed have no reasonable expectation of privacy, (ii) there is no intervention on the part of the researcher nor any interaction between the researcher and those observed, and (iii) individuals are not identifiable in the results. <p>If 'YES', please complete B and C below.</p>		
2	<p>Does your project involve working with animals?</p> <p>– If 'YES', please complete B and C below. – Please note that for ethical consideration: 'Animals' are classed as vertebrate animals including cyclostomes and cephalopods (DIRECTIVE 2010/63/EU)</p>		
3	<p>Does your project involve working with participants from any of the following categories?</p> <ul style="list-style-type: none"> • Minors (under 18 years of age) • People with learning or communication difficulties • Patients • People in custody • People engaged in illegal activities <p>If 'YES', please complete D below.</p>		
4	<p>Does your project have any possible ethical implications other than those outlined in questions 1, 2 and 3?</p> <p>If 'YES', please complete E below.</p>		

A. I consider that this project has no significant ethical implications² to be brought through the ICA School Ethics Review Process
Please complete Section 4



¹ If there is any doubt, researchers should contact the Chair of the SREC.

² In determining significant implications, please consider all potential risks attached to this project. If there is any doubt, researchers should contact the Chair of the SREC.

B.

I. Is this study part of a larger project that already has ethical clearance?

NO

If YES please answer question B II.

If NO please answer question C.

II. If this study is part of a larger project that already has ethical clearance, are you proposing any changes to the operational plan already ethically approved?

NO

If YES, please complete *Sections 3 and 4*.

If NO, then please provide the project details below and complete *Section 4*.

Title of project with ethical clearance: _____

C. Could this project have ethical implications that should be brought before the appropriate ICA Departmental Ethics Review Committee as it will be carried out with human participants?

NO

If YES, please complete *Sections 3 and 4*.

If NO, please complete *Section 4*.

D. I consider that this project may have ethical implications that should be brought before the School Research Ethics Committee as it will be carried out with human participants in a "vulnerable" category.

Please complete *Sections 3 and 4*

☐

All research carried out with human participants in a vulnerable category must be referred by the Departmental Research Ethics Committee to the School Research Ethics Committee for approval.

E. Could this project have ethical implications, other than those previously outlined, that should be brought before the appropriate ICA Departmental Ethics Review Committee?

NO

If YES, please complete *Sections 3 and 4*.

If NO, please complete *Section 4*.

Section 3

3.1 Application Form Checklist

Please complete Section 3 and provide additional information as attachments.

My application includes the following documentation:	INCLUDED (mark as YES)	NOT APPLICABLE (mark as N/A)
Recruitment advertisement		N/A
Participant Information Leaflet		N/A
Participant Informed Consent form		N/A
Questionnaire/Survey		N/A
Interview/Focus Group Questions		N/A
Debriefing material		N/A
Evidence of approval to gain access to off-site location		N/A
Ethical approval from external organizations. If ethical approval from external organizations is pending give details below		N/A
Details		

3.2 Project Details

a) Lay description (Maximum 200 words)

Please outline, in terms that any non-expert would understand, what your research project is about, including what participants will be required to do. Please explain any technical terms or discipline-specific phrases.

Bias is a concept where certain groups or types of data are favored over others, leading to unfair outcomes. The proposed project focuses on analyzing preprocessing techniques with an aim to find better ways to prepare data for machine learning tasks. We hope to make machine learning models that are fairer and accurate while reducing bias by going beyond conventional approaches used for these tasks.

This project involves the study of different analysis techniques, bias detection techniques, and various methods of sampling data to create a comparative study. Instead of using the traditional methods, we'll try new and innovative approaches to make sure that the data being used by the machine learning models are balanced and representative. This work aids in the development of ethically responsible AI systems. We have planned to use the **COMPAS Recidivism Racial Bias** dataset that is publicly available on Kaggle for this task.

The COMPAS Dataset is a popular public-domain commercial algorithm used by judges and parole officers to score a criminal defendant on the individuals' likelihood of reoffending. A two year follow up study on this data has already proved that the data is biased in favor of white defendants and against black inmates. Studies have shown that the pattern of mistakes in the algorithm as measured by precision/sensitivity is notable which makes it optimal for our proposed research.

This data is a public dataset available on Kaggle. The observations in the data includes names of inmates, case id, dates and type of crime among others. We intend to use these to find the metrics for bias for example, how do African-american names cause bias when compared to white names etc.

b) Research objectives (Maximum 150 words)

Please summarise briefly the objectives of the research.

- To investigate multiple pre-processing methods for mitigation of bias (such as suppression, massaging the dataset, reweighting techniques, sampling)
- To examine the performance of machine learning models based on different performance metrics (Example: specificity and accuracy) and different bias metrics (Examples: statistical parity difference, average odds difference)
- Comparative analysis of machine learning algorithms meant for detection and mitigation of bias (Examples: Fairness-aware algorithms, dimensionality-reduction and fair-representation learning, anonymization among others)
- To try to use our inferences for pre-processing techniques to novel approaches in mitigation of bias.

c) Research location and duration

Location(s)/Population*	DkIT campus
Research start date	March 2024
Research end date	August 2024
Approximate duration	6 months

* If location/Population other than DkIT campus/population, provide details of the approval to gain access to that location/population as an appendix.

3.3 Participants

		YES	NO	N/A
Do participants fall into any of	Minors (under 18 years of age)			✓
	People with learning or communication difficulties			✓

the following special groups?	Patients			✓
	People in custody			✓
	People engaged in illegal activities (e.g. drug-taking)			✓
Have you given due consideration to the need for satisfactory Garda clearance?				✓

3.4 Sample Details

Approximate number	N/A
Where will participants be recruited from?	N/A
Inclusion Criteria	N/A
Exclusion Criteria	N/A
Will participants be remunerated, and if so in what form?	
N/A	

Justification for proposed sample size and for selecting a specific gender, age, or any other group if this is done in your research.

N/A

3.5 Risk to Participants

- a) Please describe any risks to participants that may arise due to the research. Such risks could include physical stress, emotional distress, perceived coercion e.g. lecturer interviewing own students. Detail the measures and considerations you have put in place to minimize these risks

The names will be used during the research process as it contains valid metrics for identifying bias. The case id will be used to identify and link the observation to previous offences. GDPR regulations will be followed during the overall process of data handling.

- b) What will you communicate to participants about any identified risks? Will any information be withheld from them about the research purpose or procedure? If so, please justify this decision.

The data will be obtained from a data hosting platform called Kaggle. The dataset in the platform is listed as 'COMPAS Recidivism Racial Bias'. This data will be stored in DkIT OneDrive.

3.6 Informed Consent

	YES	NO	N/A
Will you obtain active consent for participation?			✓
Will you describe the main experimental procedures to participants in advance?			✓
Will you inform the participants that their participation is voluntary and may be withdrawn at any point?			✓
If the research is observational, will you ask for their consent to being observed?			✓
With questionnaires, will you give participants the option of omitting questions they do not want to answer?			✓
Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?			✓
Will the data be anonymous?			✓
Will you debrief participants at the end of their participation?			✓
Will your project involve deliberately misleading participants in any way, or will information be withheld?			✓
If you answer yes, give details and justification for doing this below.			✓

a) Please outline your approach to ensuring the confidentiality of data (that is, that the data will only be accessible to agreed upon parties and the safeguarding

mechanisms you will put in place to achieve this.) You should include details on how and where the data will be stored, and who will have access to it.

According to the DkIT data retention policy.

b) Please outline how long the data will be retained for, if it will be destroyed and how it will be destroyed.

1.Storage: All data will be retained for 6-12 months after the completion of the project. It will be stored for access in DkIT OneDrive.

2. Access: The dataset is open-source. Access to the research files will be restricted to the researcher and the supervisor.

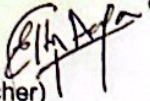
3. Communication: All communication will be held through DkIT email system and Microsoft Teams meetings.

4. Digital Platform Usage: Since the dataset is opensource, no specialised protection is needed. The files related to the research will be stored as per the researchers needs while ensuring that no party other than the supervisors have access to it.

5. Data maintenance: Data will be maintained on the institute's cloud system as a compressed password protected file.

Section 4

Researcher I have read and I understand the DkIT Ethics Policy available from:
<https://www.dkit.ie/assets/uploads/documents/Research/Policies/DkIT%20Research%20Ethics%20Policy.pdf>

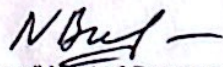
Signed: 
(Researcher)

Print Name: Elton Grivith D'Souza

Date: 15 Apr 2024

Supervisor: Applications for Ethical Approval of Undergraduate projects are forwarded to the Departmental Research Ethics Committee for approval or referral to the School Research Ethics Committee. Applications for Ethical Approval of Postgraduate and Staff projects are sent to the School Research Ethics Committee for Approval.

I have read and approved this form & information:

Signed: 
(Supervisor/Head of Department/ Research Centre Director/ Head of School)

Print Name: Natalia Budarina

Date: 15 Apr 2024

There is an obligation on the researcher and/or supervisor to bring to the attention of the Departmental/School Research Ethics Committee(s): (a) Any issues with ethical implications not clearly covered by this form (b) Any ethical issues which may arise during the carrying out of the research; (c) Any ethically significant change made to the project after approval.

Section 5 (For office use only)

STATEMENT OF ETHICAL APPROVAL (FOR UNDERGRADUATE PROJECTS ONLY)

This project has been considered using agreed department procedures and is now:

Approved:

☐

Referred to the School Ethics Committee:

☐

Signed: _____ Print Name: _____ Date: _____
(Chair of Departmental Research Ethics Committee/Head of Department)

STATEMENT OF ETHICAL APPROVAL

This project has been considered using agreed School procedures and is now:

Approved:

☐

Rejected (further information sought):

☐

Chair of School Research Ethics Committee

This project has been considered by the Ethics Committee and ethical approval is granted.

Signed: _____ Print Name: _____ Date: _____
Chair of School Research Ethics Committee