MATTHEW CUNNINGHAM | 6-21-23

S.A.F.E. | A.I.
STRUCTURED APPROACHES FOR FAIR AND ETHICAL A.I. APPLICATIONS
BLOCKCHAIN & DISTRIBUTED LEDGER SOLUTIONS FOR COPYRIGHTED ART WORKS

The rise of Artificial Intelligence/Machine Learning (AI/ML) text-to-image Art generators has caught the attention of the world through the proliferation of applications like Midjourney, Dall-E2, and Stable Diffusion. Applications which while compelling, are fundamentally powered by Copyrighted material for which no licensing agreement exists, no credit to the creator is attributed, and no compensation has been negotiated.

It isn't hyperbole when critics describe the utilization of the Laion-5B database, an 'educational database' of 5 billion images 'scraped' from the internet, and later converted into a for-profit resource, as the biggest art heist in the history of the world.

Prevailing apologist arguments for the rapid unlawful dispossession of entire castes of creative classes via A.I. Generative Art applications, are typified by stale talking points accentuated with idioms like ' The horse has left the barn', 'The toothpaste is out of the tube.' and 'the genie is out of the bottle', failing to realize, that someone skilled, built the barn, tamed the horse, tubed the toothpaste, cast the bottle, and ultimately, placed the Genie inside of it, and the bottle within a password protected vault no less.

Technology is the best hope for a hedge against a seemingly uncontainable entity, whether that be a raging fire, an invasive species, or a hyper-accelerated technological software development. 21st century software quandaries are best solved by 21st century software remedies as the latter is alike in conception to the former as a consequence of the similar processes which bore them.

AI/ML models are an elegant lever, able to foist an extremely large amount of data, utilizable in a meaningful way for quantitative pursuits like logistics management, financial models, and medical diagnosis, but fall dramatically short, when consideration is given to qualitative outputs, as their value is completely dependent on the source material inputs and totally derivative in nature and scope. Over dependence on such tools becomes an increasingly self-referential and recursive process, which not only portends the displacement of countless jobs in the Entertainment, Design, and Visual Arts Industries, but if left wholly unchecked, could erode the deep cultural knowledge of the visual arts and dramatically affect the United States pre imminent position as the world's leader in Creative Cultural Exports, within the span of a single generation

The principal conundrum, is how to protect Intellectual Property and Copyrighted materials, safe guarding developing future artists and past works, without impeding desirable developments in useful technological applications for Artificial Intelligence and Machine Learning. Presently, Blockchain Technology is an option worth considering in whole or in part.
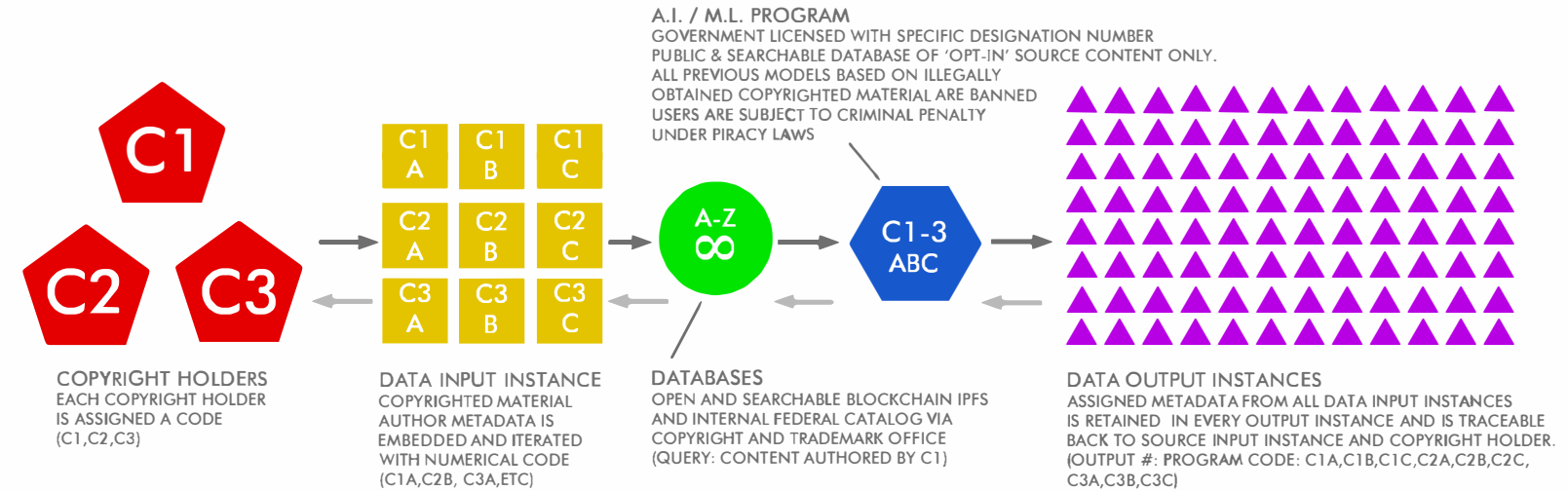
Primary Objectives

1. **Prevent mass intellectual property theft.**

2. **Credit, Consent, and Compensation (CCC) for copyright holders.**

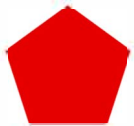3. **Create an auditable transparent database of copyrighted material.**

Summary

The misapplication of Generative AI systems has led to mass intellectual property theft. The entities in question have used databases created strictly for educational research to train for-profit Generative AI systems. These entities have been utilizing copyrighted material to profit without adequately or contractually compensating the copyright holders.

Through distributed ledger technology, we can create a consensual transparent system that will protect copyright holders and ensure legal utilization of Generative AI technology.

It is important to realize that the most prominent proponents of Generative AI are large organizations with sufficient resources to adapt to new legal regulations. Furthermore, existing laws surrounding copyright infringement and intellectual property theft are already being violated at a planetary scale. Rectifying these violations will be a long and resource-intensive process, which is neither favorable for the Generative AI Corporations nor the Copyright Holders. What is being proposed in the following documentation is a favorable arrangement that allows for the existing Generative AI Corporations to continue developing unique technology while remaining within the bounds of the law and contractual obligations to copyright holders.

A.I. / M.L. PROGRAM
GOVERNMENT LICENSED WITH SPECIFIC DESIGNATION NUMBER
PUBLIC & SEARCHABLE DATABASE OF 'OPT-IN' SOURCE CONTENT ONLY.
ALL PREVIOUS MODELS BASED ON ILLEGALLY
OBTAINED COPYRIGHTED MATERIAL ARE BANNED
USERS ARE SUBJECT TO CRIMINAL PENALTY
UNDER PIRACY LAWS

C1 **C2** **C3**

C1 A	C1 B	C1 C
C2 A	C2 B	C2 C
C3 A	C3 B	C3 C

A-Z ∞   C1-3 ABC

COPYRIGHT HOLDERS
EACH COPYRIGHT HOLDER
IS ASSIGNED A CODE
(C1,C2,C3)

DATA INPUT INSTANCE
COPYRIGHTED MATERIAL
AUTHOR METADATA IS
EMBEDDED AND ITERATED
WITH NUMERICAL CODE
(C1A,C2B, C3A,ETC)

DATABASES
OPEN AND SEARCHABLE BLOCKCHAIN IPFS
AND INTERNAL FEDERAL CATALOG VIA
COPYRIGHT AND TRADEMARK OFFICE
(QUERY: CONTENT AUTHORED BY C1)

DATA OUTPUT INSTANCES
ASSIGNED METADATA FROM ALL DATA INPUT INSTANCES
IS RETAINED IN EVERY OUTPUT INSTANCE AND IS TRACEABLE
BACK TO SOURCE INPUT INSTANCE AND COPYRIGHT HOLDER.
(OUTPUT #: PROGRAM CODE: C1A,C1B,C1C,C2A,C2B,C2C,
C3A,C3B,C3C)

LEGEND

COPYRIGHT HOLDER | OWNER| CREATOR
AN INDIVIDUAL OR COMPANY. COPYRIGHT LAW SHOULD NOT APPLY TO 'A.I. GENERATED CONTENT'
PER THE RECOMMENDATION FROM THE COPYRIGHT AND TRADEMARK OFFICE

COPYRIGHTED MATERIAL | DATA INPUT INSTANCE
POETRY, NOVELS, MOVIES, SONGS, SOFTWARE, ARCHITECTURE, ETC.
EXPANSIONS OF CATEGORY SHOULD BE CONSIDERED AND INTERFACE WITH IDENTITY THEFT LAW

COPYRIGHT DATABASE | WEB 2.0 & WEB 3.0
SEARCHABLE METADATA ASSOCIATED WITH COPYRIGHTED DATA INSTANCES IS CATALOGED UPON PREPERATION OF INPUT INSTANCE
AS A PREREQUISITE FOR DATA INGESTION BY A GENERATIVE PROGRAM. CAN BE CENTRALISED AND DISTRIBUTED VIA IPFS.

COMPUTER PROGRAM | GENERATIVE A.I./M.L. MODEL
CCC. CONSENT, CREDIT, COMPENSATION FOR COPYRIGHT HOLDERS. MODEL BASED ONLY ON 'OPT-IN',CONTENT AUTHORIZED BY HOLDER
ENTIRE CONTENT DATABASE OF PROGRAM IS TRANSPARENT, SEARCHABLE, AND SUBJECT TO FEDERAL LICENSING AND OVERSIGHT.

A.I./M.L. INTERPOLATED MATERIAL | DATA OUTPUT INSTANCE
SEARCHABLE METADATA ASSOCIATED WITH ALL COPYRIGHTED DATA INSTANCES USED, IS EMBEDDED IN OUTPUT INSTANCE AND TRACEABLE
TO SOURCE MATERIAL VIA INDEPENDENT DATABASES AS A PREREQUISITE FOR ANY APPLICATION OR USAGE OF THE INSTANCE COMMERCIALLY.
OVERLY 'DISRUPTIVE' IMPLEMENTATION OF A.I./M.L. DATA OUTPUT INSTANCES SHOULD BE LIMITED,BY LAW

CUNNINGHAM
CONCEPT DESIGN

MATTHEW CUNNINGHAM | 6-21-23

EVERY LITTLE STEP Ai TAKES, YOU WILL BE THERE…
BLOCKCHAIN & DISTRIBUTED LEDGER SOLUTION FOR TRACKING COPYRIGHTED WORKS

USE CASE SCENARIO 1
INDIVIDUAL & GROUP COPYRIGHT HOLDERS

1. INDIVIDUAL OR GROUP (CORPORATION, MUSIC LABEL, SCHOOL, ETC) COPYRIGHT HOLDER IS ASSIGNED UNIQUE COPYRIGHT LICENSE ID # BY FEDERAL AND/OR STATE ENTITY

2. COPYRIGHT HOLDER (CH) CREATES FILE (ART,MUSIC,DOCUMENT)

3. CH USES A.P.I.TO UPLOAD FILE(S) TO INTAKE HUB VIA BLOCKCHAIN AND/OR DISTRIBUTED LEDGER TECHNOLOGY

4. CH SELECTS AND POPULATES METADATA FIELDS ASSOCIATED WITH FILE(S)

5. UPLOADED FILE(S) AND METADATA ARE PERMANENTLY REGISTERED AND STORED IN THEIR ORIGINAL STATE IMMUTABLY, TRACKABLE VIA UNIQUE ID # ON SEVERAL DATABASES AND MULTIPLE NODES SIMULTANEOUSLY, MINIMIZING DATASET VULNERABILITY

6. CH WILL SET TERMS VIA SMART CONTRACT FOR 'OPT-IN' ROYALTY STRUCTURES AND PAY-OUTS FOR WORKS UTILIZED BY GENERATIVE A.I. PLATFORMS, AGENCIES, OR OTHER INTERESTED PARTIES. TERMS MAY BE NEGOTIATED INDIVIDUALLY OR AS PART OF PRE-ESTABLISHED COLLECTIVE BARGAINING AGREEMENTS

7. ONLY LEGALLY ACQUIRED RIGHTS TO COPYRIGHTED MATERIAL VIA STEP 6 ABOVE ARE USABLE IN A.I./M.L MODELS, VIOLATORS ARE SUBJECT TO LEGAL ACTION, CRIMINAL PENALTY AND/OR SUSPENSION OF LICENSES

EVERY LITTLE STEP Ai MAKES, WE'LL BE TOGETHER…
BLOCKCHAIN & DISTRIBUTED LEDGER SOLUTION FOR TRACKING COPYRIGHTED WORKS

USE CASE SCENARIO 2
ARTIFICIAL INTELLIGENCE & MACHINE LEARNING COMMERCIAL MODEL

8. A.I./M.L. COMMERCIAL MODEL IS ASSIGNED UNIQUE COPYRIGHT LICENSE ID # BY FEDERAL AND/OR STATE ENTITY (UNLICENSED, COMMERCIAL A.I./M.L. MODELS ARE ILLEGAL, EDUCATIONAL MODELS HAVE DIFFERENT PARAMETERS ALSO SUBJECT TO REGULATION)

9. A.I./M.L. COMMERCIAL MODEL ACQUIRES DATA SET(S) COMPRISED ONLY OF LEGALLY ACQUIRED COPYRIGHTED MATERIALS

10. CREDIT, CONSENT, AND COMPENSATION (CCC) FOR CREATORS OF COPYRIGHTED WORKS ARE STRICTLY OBSERVED. VIOLATIONS OF SMART CONTRACT TERMS RESULT IN SIGNIFICANT LEGAL CONSEQUENCES

11. ALL DATA INSTANCES CONTAINED IN DATA SETS ARE PUBLICLY VIEWABLE AND SEARCHABLE VIA PUBLIC DATABASE(S), ARE REGISTERED WITH THE COPYRIGHT OFFICE, AND ARE TRACEABLE TO ORIGINAL COPYRIGHT HOLDERS AND ALL ASSOCIATED METADATA AND ADJACENT FILE ASSOCIATIONS (JSON FILE)

12. A.I./M.L. A.P.I. RECEIVES INPUT FROM USER VIA TEXT, SPEECH, GESTURE,ETC. THEN REFERENCES AVAILABLE DATA SETS CONTAINING TRACEABLE INSTANCES OF COPYRIGHTED MATERIAL THAT HAS BEEN LAWFULLY ACQUIRED VIA CERTIFIED DISTRIBUTED LEDGER(S) AND BLOCKCHAIN ACCESS REQUEST AND VERIFICATION

13. A.I./M.L. OUTPUTS ARE NOT COPYRIGHTABLE AND ARE TRACEABLE TO ORIGINAL SOURCE MATERIALS VIA EMBEDDED METADATA/ JSON FILES AND THE ASSOCIATED 'CHAIN OF CUSTODY' RECORD THERIN.

14. A.I./M.L. OUTPUT METADATA INCLUDES ALL REFERENCED COPYRIGHT ID #'S AND INTERFACES WITH SMART CONTRACT AGREEMENTS SPECIFIED IN CREDIT, CONSENT, AND COMPENSATION (CCC) CLAUSES

15. A.I./M.L. OUTPUTS ARE LABELED AS SUCH, ARE NOT PRIVY TO COPYRIGHT PROTECTION AND ARE REQUIRED TO REFERENCE SOURCE INPUTS AND ASSOCIATED SMART CONTRACTS IN ASSOCIATED METADATA/JSON FILE

System Functionality

Key components
- Copyrighted Artwork Database(s)
- A.I./M.L. Generated Database(s)

Immutable Copyrighted Artwork Database Intake System
The Intake System Includes the following functions:

1. Intake Hub

2. Metadata Embedding System

3. Copyrighted Artwork Integration

A.I./M.L. Generated Content Database
The A.I./M.L. Generated Content database Includes the following functions

1. Prompt-Based Generation System

2. Metadata Embedding System

3. A.I-Generated Content Database Integration

Glossary

AI (Artificial Intelligence): The simulation of human intelligence in machines, enabling them to perform tasks that typically require human intelligence, such as visual recognition, natural language processing, and decision-making, etc.

Machine Learning: A branch of AI that involves algorithms and models that enable computers to learn from and make predictions or decisions based on data without being explicitly programmed.

Generative AI: AI algorithms or models that can generate content based on patterns and examples learned from training data.

AI Generated Content: Content that is created by AI algorithms or models.

Blockchain: A decentralized and distributed digital database that records sequential transactions across multiple computers.

Distributed Architecture: A data architecture approach where data and processing are distributed across multiple nodes or entities rather than in centralized servers.

Metadata: Descriptive information about a work, including details such as title, author, creation date, and copyright information.

Smart Contract: A digital contract stord on the blockchan, affiliated with data instances (Images, Music, Video) that specifies licensing, usage permissions and royalty arrangements.

Copyright: A legal right granted to the creator of an original work, granting them exclusive rights to reproduce, distribute, display, or perform the work and control its derivatives.

Copyright Infringement: The unauthorized use, reproduction, distribution, or display of copyrighted material without permission from the copyright holder.

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NICHOLAS PAPILLON

AI-Based Copyright Infringement Detection Project - MK1
EXECUTIVE SUMMARY: 5/28/23

Our project aims to develop an AI-based copyright infringement detection system for cataloging AI generated content. The system will ensure that AI-generated works do not violate copyright laws and provide a comprehensive catalog with metadata. Leveraging a hybrid approach using web 2.0, AI technologies, IPFS (distributed architecture), and external copyright databases, our solution will help protect the rights of artists and copyright holders in the digital art domain.

The project consists of three main phases: Analysis and Planning, Development and Implementation, with Deployment and Refinement being the third. In the Analysis and Planning phase, we will define the project scope, establish the system architecture and ensure legal compliance. The Development and Implementation phase will involve building AI models for infringement detection and metadata extraction, implementing the backend and frontend systems, integrating with IPFS and external copyright databases and conducting thorough testing. The Deployment and Refinement phase will focus on deploying the system to production, continuously improving the user interface and adapting to evolving legal requirements.

Key components of the system architecture include a Metadata Catalog Database (Web 2.0 Based) for storing metadata, an AI Model for copyright infringement detection, IPFS integration for decentralized content storage and integration with external copyright databases or APIs (for cross-referencing information and preventing data tampering).

The project team consists of various roles, including a Project Manager, Technical Architect, Legal Consultant, AI Engineer, Backend and Frontend Developers, Database Administrator, QA Engineer, DevOps Engineer and UX/UI Designer. Each team member has specific responsibilities throughout the project's lifecycle. Deployment and maintenance activities will ensure the system's performance, security and usability. Risk assessment and mitigation strategies will be implemented to address potential data breaches, legal challenges and system vulnerabilities.

In conclusion, our technical business plan (a separate document) outlines a comprehensive solution for cataloging digital art content while ensuring copyright compliance. By integrating AI-based infringement detection, decentralized storage and external copyright databases; we aim to provide a robust and user-friendly system that safeguards artists' rights in the AI-generated art domain.

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The following is a technically detailed description:

1. **Data Collection and Preprocessing:** The AI system will require a large dataset of copyrighted works and non-infringing materials; the dataset would include various types of content, such as images, text, audio, or video. The data is preprocessed by converting it into a suitable format(s) for analysis which may involve resizing images, tokenizing text, or extracting audio features.

2. **Feature Extraction:** Advanced techniques (ex. deep learning and natural language processing) are used to extract discriminative features from the copyrighted material. For images, convolutional neural networks (CNNs) or feature extraction models like VGG or ResNet can be employed to learn hierarchical representations. Textual content can be processed using techniques like word embeddings (e.g., Word2Vec or GloVe) to capture semantic meaning. Audio signals can be transformed into spectrograms or mel-frequency cepstral coefficients (MFCCs) to extract relevant features.

3. **Training the AI Model:** A supervised learning approach is typically used to train the AI model. We'll train the model on a labeled dataset, where each sample is labeled as either infringing or non-infringing. Various machine learning algorithms can be used, such as support vector machines (SVM), random forests, or deep learning models like recurrent neural networks (RNNs) or transformers. The model learns to generalize patterns from the training data and make predictions based on the extracted features.

4. **Inference and Detection:** When presented with new content, the trained AI model performs inference to determine if copyright infringement or violation has occurred. The content is fed into the model, which computes a probability or confidence score for each class (infringing or non-infringing). The model uses the learned patterns and relationships to make a prediction.

5. **Threshold Determination:** The system establishes a threshold or decision boundary to determine when the probability or confidence score crosses a certain value to classify a case as infringing or non-infringing. The threshold can be determined based on various factors, such as the desired trade-off between false positives and false negatives, domain-specific requirements, or validation on a separate evaluation dataset.

6. **Post-processing and Verification:** Detected potential infringements may undergo post-processing and verification steps to enhance accuracy. This can involve additional checks, such as similarity analysis, reverse image search, or comparison against known copyright databases. Post-processing techniques like non-maximum suppression or clustering can help refine the results and reduce false positives.

ARTIFICIAL IMAGE GENERATORS AND COPYRIGHT, A TECHNOLOGICAL SOLUTION
BLOCKCHAIN & DISTRIBUTED LEDGER SOLUTIONS FOR COPYRIGHTED ART WORKS

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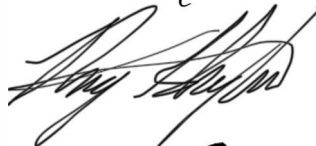Contributors:

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