CLAIMS

1. A computer-implemented method (700) for embedding copyright information in textual content, the method comprising:

authenticating, by a computing device, that a copyright holder holds a copyright of the textual content based on a first blockchain transaction identifier, ID, associated with a first transaction that recorded the textual content in a blockchain of a blockchain network, wherein the authenticating comprises:

identifying, by the computing device, the first blockchain transaction ID, and

identifying, by the computing device and in the blockchain, a second transaction associated with the first blockchain transaction ID to identify the copyright holder;

generating (702), by the computing device, a unique ID based on copyright information associated with the textual content, wherein the copyright information and the textual content are recorded on the blockchain;

identifying (704), by the computing device, one or more attributes associated with fonts used in the textual content;

digitally signing, by the computing device, the unique ID using a private key assigned to the copyright holder; and

embedding (706), by the computing device, the signed unique ID in the textual content by embedding the signed unique ID in at least one bit of a plurality of bits to change at least one of the one or more attributes associated with the fonts to be representative of the unique ID, wherein the plurality of bits are used to encode the fonts based on variable width character encoding, wherein the embedding produces information-embedded text enables retrieval of the copyright information from the blockchain based on the unique ID, and wherein a visual difference between the textual content and the information-embedded text is not apparent to an unaided human eye.

2. The computer-implemented method of any one of the preceding claims, further comprising:

after embedding the unique ID, distributing, by the computing device, the information-embedded text to the blockchain network.

3. The computer-implemented method of any one of the preceding claims, wherein the copyright information associated with the textual content includes one or more of at least a portion of the textual content or identity information of the copyright holder.

4. The computer-implemented method of claim 3, wherein the identity information is associated with the second transaction associated with a second blockchain transaction ID, and wherein the first blockchain transaction ID or the second blockchain transaction ID is associated with one or more transaction records associated with the textual content.

5. The computer-implemented method of claim 4, wherein the one or more transaction records include one or more of creatorship, copyright ownership, update history, a timestamp, a location, or a license associated with the textual content.

6. The computer-implemented method of any one of the preceding claims, wherein the unique ID is generated based on one of hashing the copyright information using a hash function or encrypting the copyright information using a public key assigned to the copyright holder.

7. The computer-implemented method of any one of the preceding claims, wherein the unique ID is further generated based on one or more of a timestamp or an address associated with the copyright information.

8. The computer-implemented method of any one of the preceding claims, wherein embedding the unique ID is performed based on digital watermarking using one or more of a discrete wavelet transform, a discrete cosine transform, a singular value decomposition, a least significant bit, or undetectable steganography.

9. The computer-implemented method of any one of the preceding claims, wherein the one or more attributes include one or more of size, orientation, or shape.

10. The computer-implemented method of any one of the preceding claims, wherein characters in the textual content associated with the fonts are visually represented by a plurality of pixels distributed based on the one or more attributes.

11. A system for embedding copyright information to content, comprising:

one or more processors; and

one or more computer-readable memories coupled to the one or more processors and having instructions stored thereon which are executable by the one or more processors to perform the method of any one of claims 1 to 10.

12. An apparatus for embedding copyright information to content, the apparatus comprising a plurality of modules for performing the method of any one of claims 1 to 10.