CLAIMS

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

generating (702), by a computing device, a unique identifier, ID, based on copyright information associated with the digital content, wherein the copyright information and the digital content are recorded on a blockchain of a blockchain network, wherein the digital content is recorded on the blockchain as a first transaction associated with a first blockchain transaction ID and the copyright information is associated with a 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 digital content;

identifying (704), by the computing device, a plurality of color values associated with one or more color attributes of at least a portion of the digital content; and

embedding (706), by the computing device, the unique ID in the digital content by changing one or more color values of the plurality of color values to be representative of the unique ID, wherein the embedding produces information-embedded digital content that enables retrieval of the copyright information from the blockchain based on the unique ID, and wherein a visual difference between the digital content and the information-embedded digital content is not apparent to an unaided human eye.

2. The computer-implemented method of claim 1, further comprising:

before generating the unique ID, authenticating, by the computing device, that a copyright holder holds a copyright of the digital content based on a blockchain transaction ID associated with a transaction that recorded the digital content in the blockchain.

3. 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 digital content to the blockchain network.

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

5. The computer-implemented method of claim 1, wherein the one or more transaction records associated with the digital content comprise a first transaction record associated with the first transaction and a second transaction record associated with the second transaction, wherein the first transaction record and the second transaction record belong to a chain-of-record associated with the digital content, wherein generating the unique identifier comprises encoding the second transaction record associated with the copyright information as the unique identifier.

6. The computer-implemented method of claim 5, wherein retrieval of the copyright information from the blockchain is enabled by extracting the unique ID from the information-embedded digital content and using the extracted unique ID to retrieve the second transaction record and retrieve the chain-of-record associated with the digital content.

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

8. The computer-implemented method of any one of the preceding claims, further comprising digitally signing the unique ID using a private key assigned to the copyright holder.

9. 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.

10. 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.

11. 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.

12. The computer-implemented method of any one of the preceding claims, wherein the one or more color attributes include one or more of hue, transparency, saturation, brightness, or gloss.

13. The computer-implemented method of any one of the preceding claims, wherein the at least a portion of the digital content is visually represented by a plurality of pixels with the one or more color attributes, and wherein embedding the unique ID includes changing the color values of the plurality of pixels to be representative of the unique ID.

14. A system (401) 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 1-13.

15. An apparatus (800) for embedding copyright information to content, the apparatus (800) comprising a plurality of modules (802 – 806) for performing the method of any one of claims 1-13.