Submitted by:
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Verance Corporation

Attn:
AI E.O. RFI Comments

Date:
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National Institute of Standards and Technology
100 Bureau Drive Mail Stop 8900
Gaithersburg, MD 20899-8900

Submitted Via *regulations.gov*

Re: Response to the National Institute of Standards and Technology Request for Information (RFI) Related to NIST's Assignments Under Sections 4.1, 4.5 and 11 of the Executive Order Concerning Artificial Intelligence, Published December 21, 2023

Dear National Institute of Standards and Technology:

I write on behalf of Verance Corporation in response to the NIST Request for Information to assist in carrying out its responsibilities under the Executive Order on Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence (EO). (See https://www.govinfo.gov/content/pkg/FR-2023-12-21/pdf/2023-28232.pdf)

Overview

In response to the RFI, Verance Corporation is submitting suggestions for AI-related standards development activities to address gaps in watermark technology performance evaluation standards. The EO and RFI makes it clear that watermark technology is critical to ensuring the authenticity and provenance of media content, including content generated by AI. However, adequate standards do not exist for the proper testing and evaluation of watermark technology.

To this end, the present submission is particularly responsive to Section 3.a bullet 7, which asks for:

> *Application specific standards (e.g., for computer vision, facial recognition technology)*

The present submission is also responsive to Section 3.1 bullet 8, which asks for:

> *Suggestions for AI-related standards development activities, including existing processes to contribute to and gaps in the current standards landscape that could be addressed, and including with reference to particular impacts of AI*

In this submission, Verance Corporation suggests that there is a strong need for the development of standards and benchmarking of watermark technology as it relates to AI.

Watermarking Technology

Watermarking technology is widely recognized to be a critical technology to ensuring that the authenticity and provenance of media content, including content generated by AI, can be established and maintained across diverse content distribution and handling environments where descriptive metadata associated with digital assets are easily lost or manipulated.

For example, the EO defines "watermarking" at Sec.3. (gg) as:

> *(gg) The term "watermarking" means the act of embedding information, which is typically difficult to remove, into outputs created by AI—including into outputs such as photos, videos, audio clips, or text—for the purposes of verifying the authenticity of the output or the identity or characteristics of its provenance, modifications, or conveyance.*

The EO, at Sec. 4.5(a), requires a report:

> *identifying the existing standards, tools, methods, and practices, as well as the potential development of further science-backed standards and techniques, for:*
>
> > *(i) authenticating content and tracking its provenance;*
> >
> > *(ii) labeling synthetic content, such as using watermarking*

The RFI, at Section 1 (Developing Guidelines, Standards, and Best Practices for AI Safety and Security) at 1.a.1, bullet 8, requests information on the topic of:

> *Economic and security implications of watermarking, provenance tracking, and other content authentication tools*

In addition, the RFI at Section 1 at 1.a.1, bullet 9 requests information on the topic of:

> *Efficacy, validity, and long-term stability of watermarking techniques and content authentication tools for provenance of materials, including in derivative work*

Finally, the RFI at Section 2. at bullet 2 requests information on the topic of:

> *Techniques for labeling synthetic content, such as using watermarking*

These citations demonstrate the centrality of watermark technology to solutions to AI-related content authentication and provenance issues.

The need for Watermarking Testing and Evaluation Standards

A variety of watermark technologies have been proposed to address AI-related content provenance and authentication issues. There is considerable debate among technologists as to how to determine the suitability of any proposed watermark technology to this purpose, including the impact of watermarks on the perceptual quality of media to which it is applied, its resiliency to modifications that occur naturally in the course of media content distribution and modification, and its resistance to tampering, removal, forgery, or other security risks.

Verance believes that there is therefore a critical need for the establishment of standard practices in the objective performance evaluation and benchmarking the performance of watermark technologies.

There are a number of existing technical standards specifying the use of watermarks. Some of these standards include performance evaluation and benchmarking frameworks. Verance has assisted a number of Standards Development Organizations in establishing watermark technology performance evaluation and benchmarking frameworks. These include:

- (2015) Society of Motion Picture and Television Engineers (SMPTE) Technology Committee on Television and Broadband (24TB) in connection with their evaluation of watermark technologies submitted in response to the "Request For Proposals for Open Standard to Bind ID to Media Assets" which led to the creation of the *SMPTE 2112-10 Standard: Open Binding of Content Identifiers* standard;
- (2014) Advanced Television Systems Committee (ATSC) Specialist Group on Management and Protocols (S33) in connection with their evaluation of watermark technologies submitted in response to the "Call for Proposals for ATSC 3.0 Automatic Content Recognition Watermarking Solutions" which led to the creation of the *ATSC A/334: Audio Watermark Emission* and *ATSC A/335: Video Watermark Emission* standards; and
- (1999) Secure Digital Music Initiative (SDMI) in connection with their evaluation of watermark technologies submitted in response to the Call for Proposals for Phase I and Phase II Screening Technologies.

In connection with the development of watermarking technical standards for music, film, and television industries, each of these standards organizations have developed objective methodologies and evaluation and assessment of the quality, efficacy, and security of watermark systems offered by responding companies in service of enabling its membership to assess and compare alternative technologies based on objective performance metrics to establish fitness for purpose. In order to establish similar assurances in the context of AI generated content, we are now faced with a critical need for the establishment of open and accessible performance evaluation criteria for watermarking technologies used in this context.

Verance Corporation Expertise

Verance Corporation is a watermarking technology specialist established in 1995.

Verance's watermark technologies have been established as industry standards by the music, film, television, consumer electronics, and computer industries and included in over 500 million consumer products from hundreds of companies worldwide with application to copyright identification and protection, rights management, interactive media experiences, media usage measurement, and addressable advertising.

In connection with the standardization activities, as mentioned above, Verance has served as the principal contributor to multiple industry efforts to establish objective performance benchmarking and evaluation frameworks for watermarking technologies. We believe that any effort to establish guidelines or regulation related to the use of watermarking technology in the context of AI and provenance authentication will benefit from the decades of knowledge and experience that Verance has in assisting industry standards organization and industry consortia in performing this task.

Verance has complete documentation associated with past frameworks developed in industry for performing objective performance evaluation and benchmarking of watermark technology. We are prepared to contribute this historical work, which has already received consensus support among many competing vendors and end-users of watermarking technology, as input to the development of new approaches suited to the current technology environments.

Verance is also a commercial developer of watermark technologies for audio and video and has laboratories, scientists, and commercial watermark technology implementations available for developing and demonstrating watermark technology performance evaluation and benchmarking frameworks. More information can be found at www.verance.com.

Thank you for the opportunity to participate in this process, and we look forward to any questions the NIST (or other interested parties) may have.

Sincerely,
Nil Shah
Chief Executive Officer