U.S. Department of Homeland Security

SCIENCE AND TECHNOLOGY DIRECTORATE

Remote Identity Validation Tech Demo Challenge

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December 2022

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We are the Department's Science Advisor and research and development arm.

Since 2003, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) has provided sound, evidence-based scientific and technical perspectives to address a broad spectrum of current and emerging threats.

Biometric & Identity Technology Center

S&T conducts foundational research to ensure advancements in science and technology are harnessed for cutting-edge solutions to new and emerging operational challenges.

- Drive biometric and identity innovation at DHS through RDT&E capabilities
- Facilitate and accelerate understanding of biometrics and identity technologies for new DHS use cases
- Drive efficiencies by supporting cross cutting methods, best practices, and solutions across programs
- Deliver Subject Matter Expertise across the DHS enterprise
- Engage Industry and provide feedback
- Encourage Innovation with Industry and Academia

Remote Identity Validation Tech Demo (RIVTD)

- Industry has developed new tools to authenticate documents and verify the identity of users remotely:
  - Remote Identity Validation (RIV)

- Difficult for industry to test the effectiveness and fairness of these systems:
  - Hard to obtain fraudulent documents
  - Testing for demographic differentials is costly

- DHS S&T is interested in understanding the current performance of RIV and help industry to develop more secure, accurate, and equitable technologies.

2023 Remote Identity Validation Technology Demonstration (RIVTD)

- DHS S&T is looking for full RIV systems and/or component technologies that are capable of:
  1. Assessing the validity of an identity document (US driver's license)
  2. Matching a "selfie" photo to the photo on the Identity Document
  3. Assessing the "liveness" of the "selfie" photograph
- DHS S&T encourages providers of technologies that can perform any portion of the RIV process to apply to participate in this demonstration
- The demonstration will follow several tracks such that each step in the RIV process will be demonstrated separately

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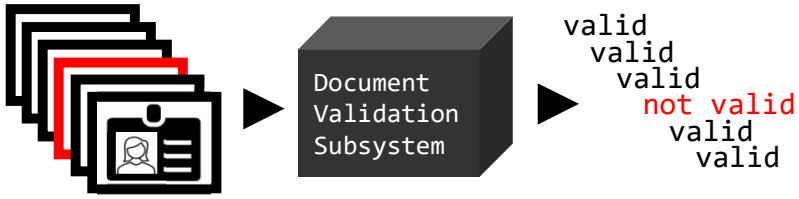
Technology Demonstrations

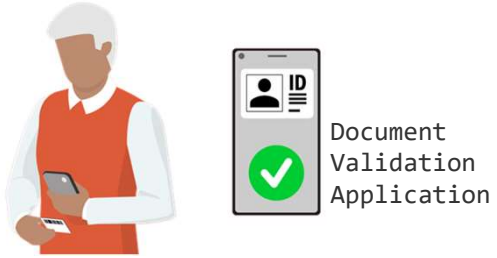
- Demonstrations are a distinct evaluation performed by DHS S&T
  - Allows DHS S&T to survey the current state of technology
  - Provides technology providers an opportunity to:
    - Demonstrate their capabilities to government and private sector stakeholders
    - Collaboratively evaluate technologies with DHS S&T
- Quantitative results of the Remote Identity Validation Technology Demonstration will be shared within the government and with participating companies.
- Select insights may be shared publicly in a manner that preserves the anonymity of the companies that participated.

Technology Tests vs. Scenario Tests

- Technology Testing:
  - Focus on performance of a single identity subsystem (e.g., identity document verification)
  - Use sequestered image datasets
  - Easily repeatable



- Scenario Testing:
  - Assess performance of identity application in the context of use
  - Real people interact with the system
  - Costly to repeat



RIVTD will begin with technology testing using sequestered images

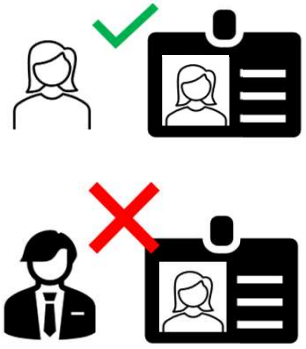
RIVTD Tracks

Track 1:
ID Validation

- Information Check
- Tamper Check
- Security Check

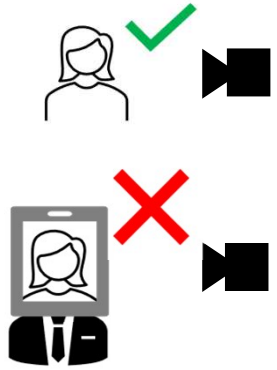
Track 2:
Match to ID

- 1:1 Verification



Track 3:
Liveness and Presentation Attack Detection (PAD)

- Reject screens and printouts
- Reject masks and other fakes



Current focus is Track 1: ID Validation

Track 1: Identity Document (ID) Validation

- RIV systems will demonstrate their ability to establish the authenticity of a US driver's license based on images of the document (front and back)

- Document Authenticity guidelines are established by (SP 800-63A - A.10.2 Identity Validation):
  - Test identity evidence for authenticity against document type libraries for **information completeness**, **format**, and **correctness**;
  - Test identity evidence for authenticity through **tamper and counterfeit detection** (this includes document liveness); and
  - Test identity evidence for authenticity by confirming **presence and verification of security features** for the type of evidence presented.

MdTF ID Validation API

Images: What do the new Maryland driver's licenses look like? (wbaltv.com)

docker

Document Validation Subsystem

- Validity Outcome:
  - `boolean (true, false)`
- Validity Score:
  - `numeric (0.0 – 1.0)`
- Validity Properties:
  - `key-value pairs`

Technical details are provided at http://github.mdtf.org

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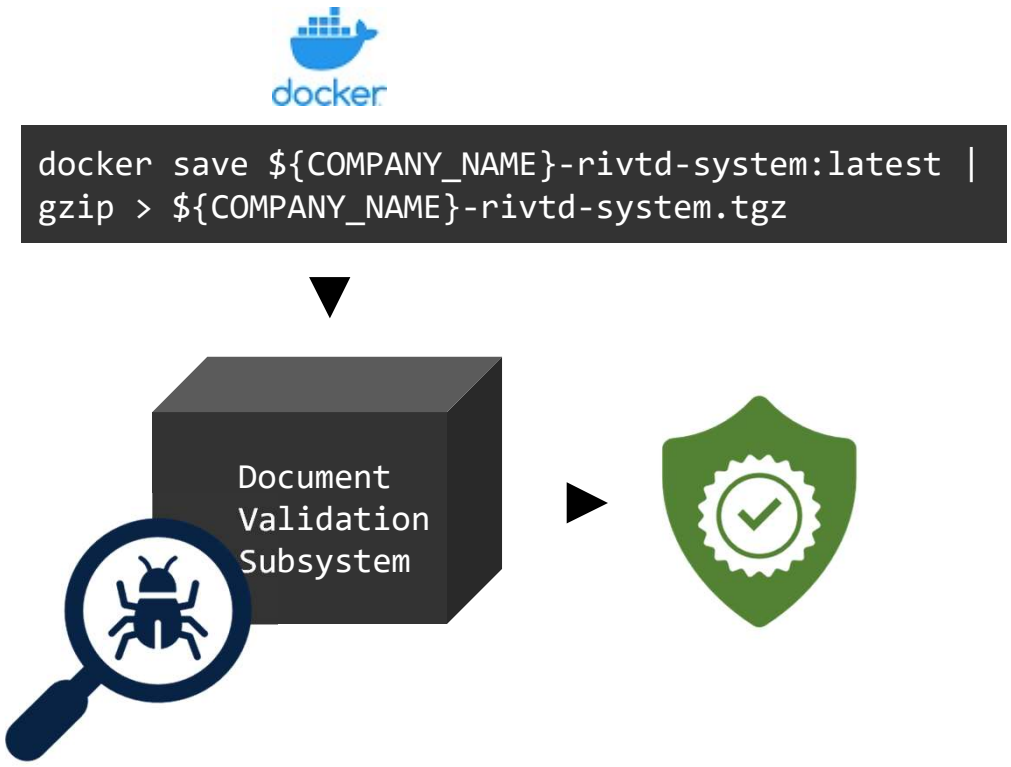
Document Validation Subsystem

- MdTF ID Validation API will be implemented via an **HTTP server**
- Deployed inside a **docker** container
- Delivered via a .tgz uploaded to a **web portal**
- Docker containers will be required to run on government systems and will be assessed for **security**.

We will work with vendors to address security requirements



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MdTF ID Validation API – Validity Outcome

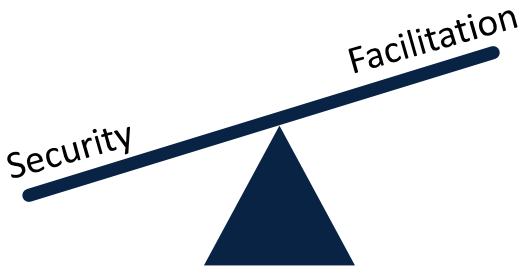
- **REQUIRED**
- ID Validation demonstration will showcase the ability of your system to:

Determine genuine documents as valid
(validityOutcome = true)

Determine fraudulent documents as not valid
(validityOutcome = false)

MdTF ID Validation API – Validity Score

- Document validation systems are strongly encouraged to return a validity score for each document
- The score should correspond to the likelihood that the document is valid (0 to 1)
  - 0.0 (0% likely to be valid)
  - 0.5 (50% likely to be valid)
  - 1.0 (100% likely to be valid)
- A score allows organizations to set thresholds to achieve different risk-based security levels to balance security and facilitation
- This score will facilitate evaluation of document validation error tradeoff



Systems that do not provide a score will not be included in this portion of the assessment, but may participate in other parts of the demonstration

MdTF ID Validation API – Validity Properties

- Document validation systems may return a set of discrete validity properties for each document
- Each validity property corresponds to the validity of specific characteristics of the document images including:
  - Document information, document security features, and document liveness
- Document validation system providers may provide any validity properties they deem important for making their validity determination. There is currently not a defined set of properties from DHS S&T.
- DHS S&T will investigate the relationship between provided validity criteria and document validation performance

Vendors may provide their own validity properties and values so long as they conform to the key-value pair format.

MdTF ID Validation API – Suggested Validity Criteria

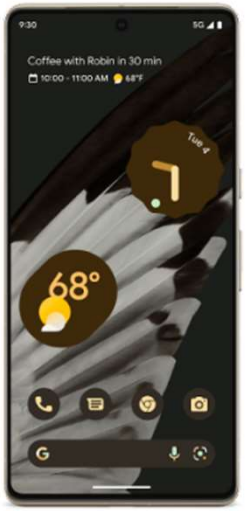
- Liveness Check – ensure document is not a copy
  - E.g., a photocopy or presented on a screen
- Information Check – ensure information on the document is correct
  - Format – information presented in correct format for the document type
  - Completeness – all information expected for the document type was found
  - Correctness – check to make sure correct information is present for the document type
    - E.g., Checksums, MRZ
- Security Check – ensure presence of security features and detect tampering
  - Security Features – ensure all security features expected in the provided images are present
  - Photo – ensure face photograph has not been tampered with
  - Data Fields – ensure no data fields have been tampered with

Refer to SP 800-63A - A.10.2 Identity Validation for more information.

ID Validation – Image Properties

- Genuine and fraudulent document images collected via mobile phones
- Cameras representative of modern mobile phones
- JPEG encoding
- Reasonable efforts to ensure quality
- Homogeneous background
- Optical perspective distortions may be present
- Separate images of front and back of document
- Images provided as base64 encoded strings

Apple iPhone 14



Google Pixel 7

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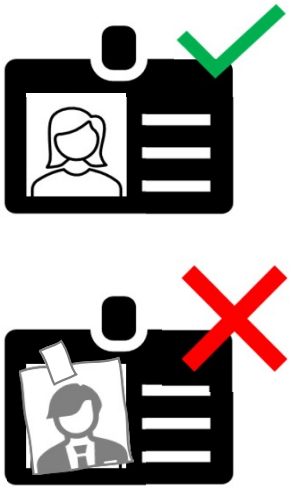
ID Validation Metrics

- **Document False Reject Rate (DFRR)** – proportion of genuine documents which the system determined to be invalid
- **Document False Accept Rate (DFAR)** - proportion of fraudulent documents which the system determines to be valid
- **System Error Rate (SER)** – proportion of document images for which the system fails to return an appropriate response
- **Document Processing Time (DPT)** – time taken by the system to process document images and return a response



For systems returning a validity score, DFAR and DFRR may be computed as a function of the score to produce a Decision Error Tradeoff (DET) curve.

Document validation DFRR performance may be disaggregated by demographics of the genuine document owner: race, gender, age.

Application Package Requirements

- Provide an application package (limit 5 pages), in the form of a white paper addressing each of the following:
  1. Description of the company
  2. Remote identity validation technology capabilities
  3. System inputs and data processing steps
  4. System outputs
  5. Description of the complexity and maturity of the remote identity validation system, including any active deployments.
  6. Any measurements of the performance characteristics of the system and how they were tested
- Optional demonstration video of system functionality.
- Submit application package to RIVTD@mdtf.org by **11:59pm (EST) February 15, 2023**

These webinar slides and detailed application package instructions will be made available at https://mdtf.org/rivtd

Questions & Answers

- Contact information
  - peoplescreening@hq.dhs.gov
- Visit our websites for additional information
  - To see additional work DHS S&T supports, visit www.dhs.gov/science-and-technology
  - For information about this and other DHS S&T technology evaluations, visit https://mdtf.org

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MdTF ID Validation API

MdTF ID Validation API - Validate

POST `/v1/validate` Validate an identity document based on images

Request Body

```
{
   “DocumentFront": "base64 string",
   “DocumentBack": "base64 string"
}
```

Example Response

```
{
   “ValidityOutcome": true,
   “ValidityScore": 0.8,
   “ValidityProperties": [
      { “Property": “DocumentInformationFormatCorrect", “Value": true },
      { “Property": “DocumentInformationCorrect", “Value": true },
      { “Property": “DocumentInformationComplete", “Value": true },
      { “Property": “DocumentInformationCompleteness", “Value": 0.9 },
      { “Property": “DocumentCheckSumsCorrect", “Value": true },
      { "Property ": “DocumentMRZCorrect", “Value": true },
      { "Property ": “DocumentLivenessCheck", “Value": "Passed" },
      { "Property ": “DocumentPhotoTampered", “Value": "Yes" },
      { "Property ": “DocumentSecurityFeaturesTampered", “Value": "None" },
      { “Property": “DocumentDataFieldsTampered", “Value": "Age changed" }
   ]
}
```

Only ValidityOutcome is required

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MdTF ID Validation API - Info

GET /v1/info Return information about the document validation algorithm

Example Response


```
{
    "AlgorithmName": ":Docvalidate",
    "AlgorithmVersion": "1.0.0",
    "CompanyName": "IDSL",
    "Event": "2023 RIVTD ID Validation",
    "RecommendedCPUs": 4,
    "RecommendedMem": 256,
    "TechnicalContactEmail": "info@mdtf.org"
}
```