

# Capabilities Statement: IARPA BRIAR

Rank One Computing Corporation

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## Company Background

Rank One Computing (ROC) develops facial recognition (FR) technology, used extensively by the U.S. military, leading U.S. law enforcement agencies, FinTech, embedded devices and other verticals. Per recent testing from the National Institute of Standards and Technology (NIST) Face Recognition Vendor Test (FRVT), Rank One's algorithm is the only "Western-friendly" FRVT submission to receive top marks in both accuracy and efficiency [1]. These properties have resulted in ROC algorithms powering applications ranging from large-scale enterprise systems to real-time on-edge processing across a range of industries.

Rank One's primary business activity is developing the ROC Software Development Kit (SDK). This software package includes lightweight face recognition and analytics libraries in a C API and a wide range of API wrappers (e.g., Python, Java, Go, Lua, C#) and applications (e.g., command line interface, the ROC Web API server).

Additionally, Rank One engages in U.S. Government research and development (R&D) services and software system development. Rank One has provided R&D and software development services to Defense Advanced Research Projects Agency (DARPA) in support of the Medifor and Semafor programs. Rank One has performed software development services in support the Combating Terrorism Technical Support Office (CTTSO) resulting in a highly scalable facial triage and analysis workstation. Rank One has also participated in a Phase I and Phase II Small Business Innovation Research (SBIR) program with U.S. Special Operations Command (USSOCOM) on face recognition at-a-distance. Rank One algorithms were successful in identifying faces up to 1km in distance, with consistent success up to 300m.

**Rank One Computing**

1120 N. Lincoln St., Suite 1607  
Denver, CO 80203



**rankone.io**

bd@rankone.io

Rank One products have recently expanded to include multiple turnkey systems. These systems, powered by the ROC SDK, offer forensic facial analysis, real-time video analytics, and mobile on-edge search and video watchlisting.

Rank One was founded by engineers, and has a deep-rooted culture of engineering and research. Rank One's team members have technical backgrounds ranging from a Ph.D. in Computer Science (CS), to many M.S. and B.S. degrees in CS. Rank One's team has been growing in size, and by the time BRIAR begins there will be several new engineers, to include at least one new CS Ph.D. hire.

Prior to Rank One's founding in 2015, the current leadership team at Rank One had experience in USG R&D. This includes our team members playing a critical role in the Testing and Evaluation (T&E) of the IARPA Janus program while at the company Noblis. Rank One team members (Brendan Klare, Josh Klontz, and Ben Klein) played critical roles in the creation of the Janus API, evaluation protocols, and data development [2][3][4]. Rank One team's members have also previously provided advisory services to USG agencies in the use of biometrics, including the Dept. of State, the Federal Bureau of Investigations, and the Dept. of Defense. Additionally, Rank One's team has published over 25 academic research papers on the topic of automated face recognition, to include several highly cited papers (e.g, [5][6][7]).

## **BRIAR Teaming Possibilities**

There are several ways Rank One can meaningfully contribute as a BRIAR team member.

### **API Integration**

Rank One is experienced at packaging computer vision algorithms into usable APIs. The ROC SDK is routinely lauded for its clean and intuitive API. Rank One's CTO Josh Klontz was also responsible for the OpenBR framework, and the creation of the initial Janus API.

BRIAR teams will be challenged by the need to bring multiple academic prototype algorithms into a unified software package that adheres to the BRIAR API. Rank One specializes in this API integration practice.

### **Algorithm Efficiency**

Rank One is a world-leader in the development of efficient machine learning and computer vision algorithms. This is evidenced by the notable efficiency



differentiation of the ROC SDK [1], which is 2x to 6x faster at template generation (image processing) than industry peers, and as much as 20x smaller in template size.

BRIAR has ambitious efficiency requirements, which includes real-time on-edge processing by the end of the program. Coupled with the capability for API integration, Rank One will be a powerful team member capable of corralling disparate algorithms and engineering them into a simple and scalable software package.

### **Person Detection and Re-Identification Algorithms**

Rank One has deep knowledge in algorithm development. Rank One routinely delivers face recognition algorithms that are in the top-echelon of the 200+ algorithms benchmarked worldwide.

In the context of BRIAR, Rank One is fully capable of developing algorithms for detection and re-identifying of full bodied person imagery.

### **Face Recognition Algorithms**

The BRIAR program calls for robust face recognition at-a-distance algorithmic capabilities. While this is Rank One's primary capability and business activity, it is not clear if Rank One will be able to contribute to the BRIAR program in relation to the face recognition requirements.

The key issue will be the desire for Government Purpose Rights (GPR) for the entire technology stack delivered in fulfillment of the BRIAR requirements. And, *under no circumstances will Rank One ever offer GPR for the ROC SDK*. This is because the USG is Rank One's largest customer, and Rank One cannot sacrifice all of the private investment that has gone into the development of these algorithms.

If IARPA is willing to accept a submission that includes components that are less than GPR, then the ROC SDK will generally solve the face recognition requirements for this program based on the accuracy and efficiency requirements set forth, and the current trajectory of the ROC SDK development. The ROC SDK is extensively deployed in support of the USG Intelligence Community, and as a commercially licensable software, it provides technical support and relevant past-performances that should generally be unparalleled to any other prospective BRIAR solution.

Aside from the ROC SDK, the Rank One team is highly experienced with the Janus API, and while it is not clear whether or not the Janus algorithms can meet the accuracy and efficiency requirements of this program, Rank One is capable of



delivering a solution based on the GPR Janus algorithms that can also be swapped out for the battle-tested ROC SDK algorithms as needed.

## References

[1]

<https://blog.rankone.io/2020/08/26/rank-one-stands-alone-with-top-tier-performance-in-nist-frvt-ongoing-benchmark/>

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[3] J. Cheney, B. Klein, A. K. Jain and B. F. Klare, "Unconstrained Face Detection: State of the Art Baseline and Challenges", ICB, Phuket, Thailand, May 19-22, 2015.

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[5] B. Klare, Z. Li and A. K. Jain, "Matching Forensic Sketches to Mugshot Photos", IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 33, No. 3, pp. 639-646, March 2011.

[6] B. Klare and A. K. Jain, "Heterogeneous Face Recognition using Kernel Prototype Similarities", IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 35, No. 6, pp. 1410-1422, June 2013.

[7] B. F. Klare, M. Burge, J. C. Klontz, R. W. Vorder Bruegge and A. K. Jain, "Face Recognition Performance: Role of Demographic Information", IEEE Transactions on Information Forensics and Security, Vol. 7, No. 6, pp. 1789-1801, December 2012.