NPIC/D-55-65

1965

MEMORANDUM FOR: Assistant Deputy Director (Intelligence)

SUBJECT : Research and Development Project Approval Request for an Automatic Target Recognition Study

REFERENCE : DDCI Memorandum ER 63-8821, dated 23 December 1963, Approval of Research and Development Activities

In compliance with paragraph 5.b. of the reference, it is requested that the automatic target recognition study outlined in attachment "A" be approved. The estimated cost of this project is [redacted] 25X1 25X1

[redacted]

ARTHUR C. LUNDAHL
Director
National Photographic Interpretation Center

X1

APPROVED: [redacted]

PAUL A. BOREL
Assistant Deputy Director
(Intelligence)

16 Apr 65
Date

Attachment: "A"

SECRET
(When Filled In)

R & D CATALOG FORM

DATE: 22 March 1965

1. PROJECT TITLE/CODE NAME

25X1 Automatic Target Recognition Study

2. SHORT PROJECT DESCRIPTION

This project is a study to establish the basic design parameters and performance characteristics of an operational prototype of an adaptive, automatic, target recognition system.

3. CONTRACTOR NAME

4. LOCATION OF CONTRACTOR

Falls Church, Virginia

5. CLASS OF CONTRACTOR

Manufacturer

6. TYPE OF CONTRACT

Fixed Price, Level of Effort

7. FUNDS

FY 19 $

25X1 FY 1965 $

FY 1966 $

8. REQUISITION NO.

N/A

9. BUDGET PROJECT NO.

NP-S-29

10. EFFECTIVE CONTRACT DATE (Begin - end)

July 1965 - March 1966

11. SECURITY CLASS.

AA--Confidential
T--Unclassified
W--Unclassified

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

25X1 DDI/NPIC/P&DS/

13. REQUIREMENT/AUTHORITY

Automated exploitation of reconnaissance imagery to assist PAG, PID, TID and to be coordinated with IPD.

14. TYPE OF WORK TO BE DONE

Applied Research

15. CATEGORIES OF EFFORT

MAJOR CATEGORY	SUB-CATEGORIES
Special Techniques & Studies	Interpreter Aids

16. END ITEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.

Final report documenting investigations and establishing final design parameters. Interim monthly technical reports will be provided.

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION

NPIC currently has a contract with [redacted], to build an image prenormalizing system. This contract is about 80% complete. The results of this system will heavily support the proposal design study directed towards a complete, operational system. Many agencies are working in this field; the Air Force has developed

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required)

This project is directed toward the development of an adaptive, automatic, target recognition system. It will be designed so as to aid operational interpreters by relieving them of the time consuming task of locating and classifying targets of interest in large volumes of intelligence imagery. The rate of acquisition of reconnaissance photography is increasing more rapidly than can be accommodated by a simple increase in exploitation manpower. Therefore, some reliable means for automating target recognition tasks must be developed.

19. APPROVED BY AND DATE

OFFICE	DEPUTY DIRECTOR	DDCI

FORM 11-64 2338

SECRET

GROUP 1 Excluded from automatic downgrading and declassification

(1-13)

R & D Catalog Form continued...

X1 17. (under a contract with [redacted] an Automatic Target Recognition Device which somewhat parallels [redacted] approach to the ultimate problem. GIMRADA is supporting research for an Automatic Image Classification System for use in their Rapid Combat Mapping Program; while the Army Electronics Command is supporting the development of an Automatic Imagery Screening System for their Tactical Image Interpretation Facility. Furthermore, the Navy is developing a similar system for A.S.W. applications. All of these systems have been reviewed and it has been determined that none duplicate the new system proposed by [redacted] The number of current contracts in this field give testimony to the validity of the operational requirement for this research. 25X 25X

18. Although research has been directed for many years toward the development of automated image recognition systems, all of the efforts have been plagued with several persistent problems. One of the most difficult of these problems was the fact that adaptive memory computers were very sensitive to image rotation and translation. In other words, before a computer of the Perceptron type could be taught to recognize an unknown image as belonging to a class, the unknown image had to be in the same orientation and in the same part of the field as the images which were used previously in training the machine. If the unknown images were re-oriented or translated, the computer probably would not recognize them.

It was decided that until this problem was overcome, there would be little hope in developing a successful automatic target recognition device. To attack this problem and others, [redacted] was awarded a contract to develop a system to pre-normalize imagery (in rotation and translation) before the computer was asked to identify it. The resultant system is a line-integral image scanner and a video signal processor working in-line with the Conflex I adaptive memory computer. This system is now undergoing a four month test period during which it will be used to process photography containing target classes which have many image variables. One type of test target images being used is U.S. Army tanks which have different orientations and positions on the image, various levels of resolution and contrast, various degrees of obscuration, shadow effects, etc. Although these tests are not complete, early indications are that a system employing this pre-normalizer and adaptive computer will finally lead to development and design of an operational Automatic Target Recognition System. 25X

The proposed work in this project is to perform a concerted investigation of the problems presented by an operational system and to perform a comprehensive system design study. If this phase is successful, it is predicted that an operational Automatic Target Recognition System, useful to the exploitation community, could be produced in about two years. No pursuit of the System's development is contemplated unless the investigation phase is successfully completed.