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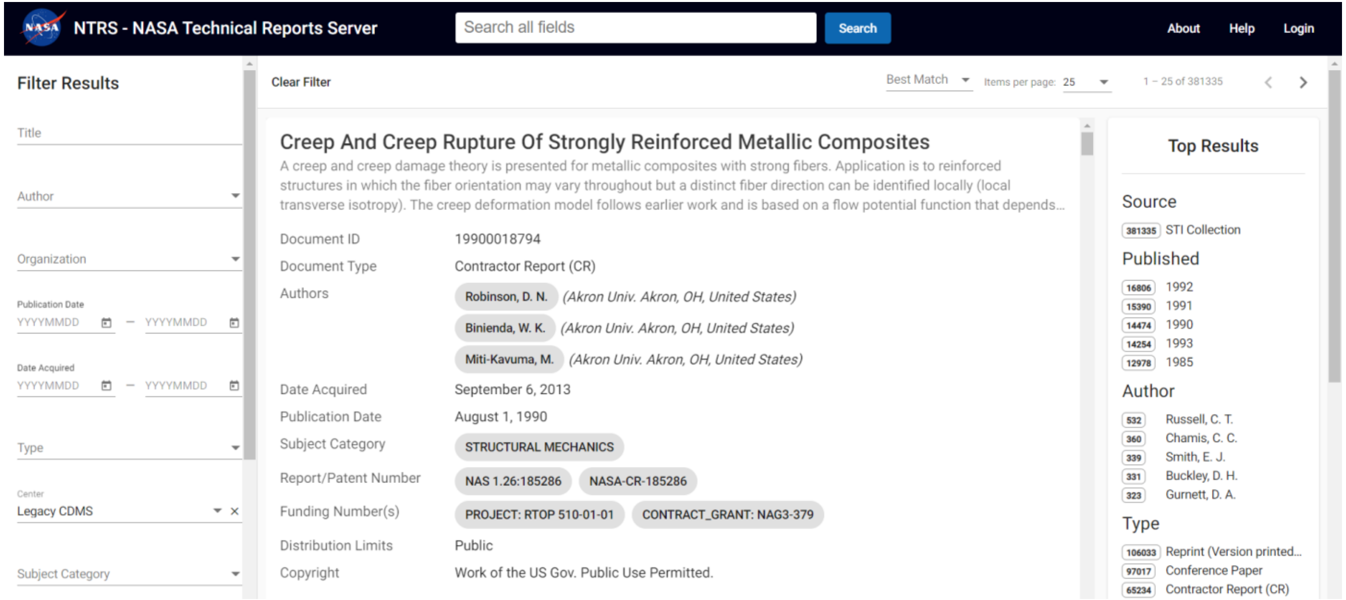
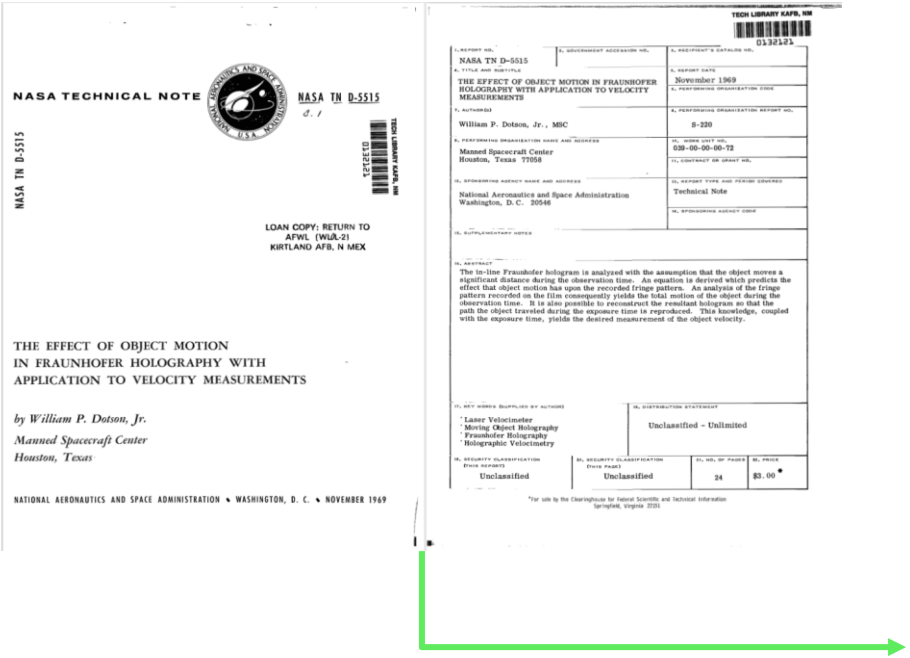
NASA NTRS Text Analysis: Legacy Challenge 2022

By Team Neon_Hackers
Madhu Raut & Vivek Kanna Jayaprakash

1. Downloading all the required PDFs using the NASA NTRS API



2. Extraction of text from PDFs and creating a Corpus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THE EFFECT OF OBJECT MOTION IN FRAUNHOFER HOLOGRAPHY WITH APPLICATION TO VELOCITY MEASUREMENTS

by William P. Dotson, Jr.
Manned Spacecraft Center
Houston, Texas

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • NOVEMBER 1969

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1. Report No. NASA TN D-5515	5. Report Date November 1969
4. Title and Subtitle THE EFFECT OF OBJECT MOTION IN FRAUNHOFER HOLOGRAPHY WITH APPLICATION TO VELOCITY MEASUREMENTS	
7. Author(s) William P. Dotson, Jr., MSC	8. Performing Organization Report No. S-220
9. Performing Organization Name and Address Manned Spacecraft Center Houston, Texas 77058	10. Work Unit No. 039-00-00-00-72
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D. C. 20546	13. Report Type and Period Covered Technical Note

16. Abstract

The in-line Fraunhofer hologram is analyzed with the assumption that the object moves a significant distance during the observation time. An equation is derived which predicts the effect that object motion has upon the recorded fringe pattern. An analysis of the fringe pattern recorded on the film consequently yields the total motion of the object during the observation time. It is also possible to reconstruct the resultant hologram so that the path the object traveled during the exposure time is reproduced. This knowledge, coupled with the exposure time, yields the desired measurement of the object velocity.

17. Key Words (Supplied by Author) Laser Velocimeter, Moving Object Holography, Fraunhofer Holography, Holographic Velocimetry	18. Distribution Statement Unclassified - Unlimited
19. Security Classification (this report) Unclassified	20. Security Classification (this page) Unclassified
21. No. of Pages 24	22. Price $3.00

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Huygens radiator 2 THE EFFECT OF OBJECT MOTION IN FRAUNHOFER HOLOGRAPHY WITH APPLICATION TO VELOCITY MEASUREMENTS By William P. Dotson, Jr.* Manned Spacecraft Center SUMMARY This study is concerned with the development of a theory to describe the effect that object velocity has upon the recorded fringe pattern in Fraunhofer holography. The conclusion is that, under the conditions described, objects may move as much as 10 times their mean diameter during the observation time. This motion produces fringes in the hologram which are descriptive of the motion. INTRODUCTION A theoretical analysis is made of the time dependence of the intensity of the total field at a recording 511-plane due to the interference of a constant-background field with the field diffracted by a moving object. This equation is then integrated over the observation time in order to find the total energy distribution function in the (11 -plane. This study expands present Fraunhofer holography theory to include moving ob- jects, and the expanded theory is reduced to the usual result found in the literature when the object is stationary. An experiment was designed to test the theory of this study and was performed successfully. The author extends his appreciation to G. P. Bonner, N. K. Shankar, and C. W. Wells of the Science and Applications Directorate, NASA Manned Spacecraft Cen- ter, Houston, Texas, for their assistance in performing the laboratory experiments. SYMBOLS A aperture dimensions C = -ik 27rz I1 *Captain, U. S. Air Force, assigned toNASA Manned Spacecraft Center. TECH LIBRARY KAFB, NM 1 I. REPORT NO. 2. GOVERNMENT ACCESSION NO. I I NASA TN D-5515 - 1 I 4. TITLE AND SUBTITLE THE EFFECT OF OBJECT MOTION IN FRAUNHOFER HOLOGRAPHY WITH APPLICATION TO VELOCITY MEASUREMENTS I T 7. AUTHOR(5) William P. Dotson, Jr., MSC .. 9. PERFORMING ORGANIZATION NAME AND ADDRESS Manned Spacecraft Center Houston, Texas 77058 t 12. SPONSORING AGENCY NAME AND ADDRESS National Aeronautics and Space Administration Washington, D. C. 20546 i " . " -~ . .. 1 15. SUPPLEMENTARY NOTES - 3. RECIPIENT'S CATALOG NO. 5. REPORT DATE November 1969 6. PERFORMING ORGANIZATION CODE 8. PERFORMING ORGANIZATION REPORT NO. s-220 IO. WORK UNIT NO. 039-00-00-00-72 11. CONTRACT OR GRANT NO. 13. REPORT TYPE AND PERIOD COVERED Technical Note 14. SPONSORING AGENCY CODE 16. ABSTRACT ." ~.. - ~. . The in-line Fraunhofer hologram is analyzed with the assumption that the object moves a significant distance during the observation time. An equation is derived which predicts the

3. Keyword Extraction and Frequency Plot

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('Objects', 0.018289515931982178)
('experiment results', 0.01919385107004822)
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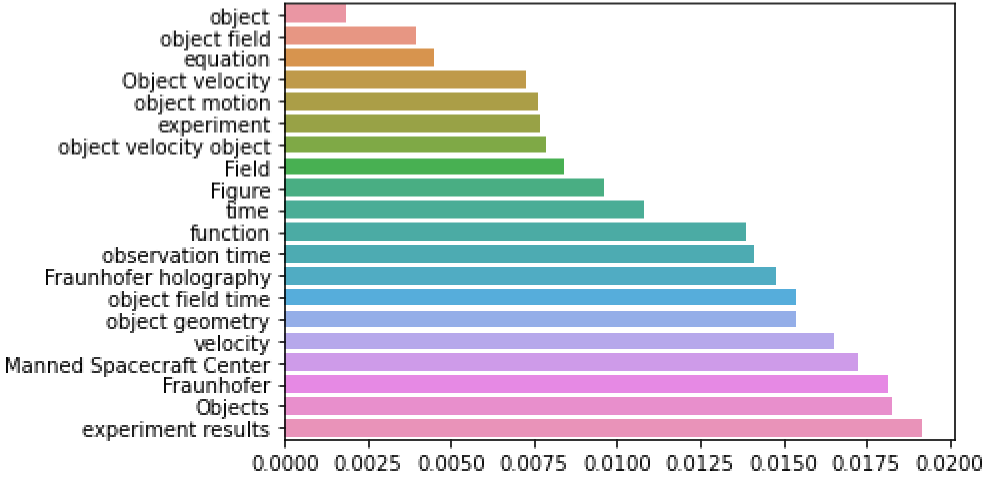
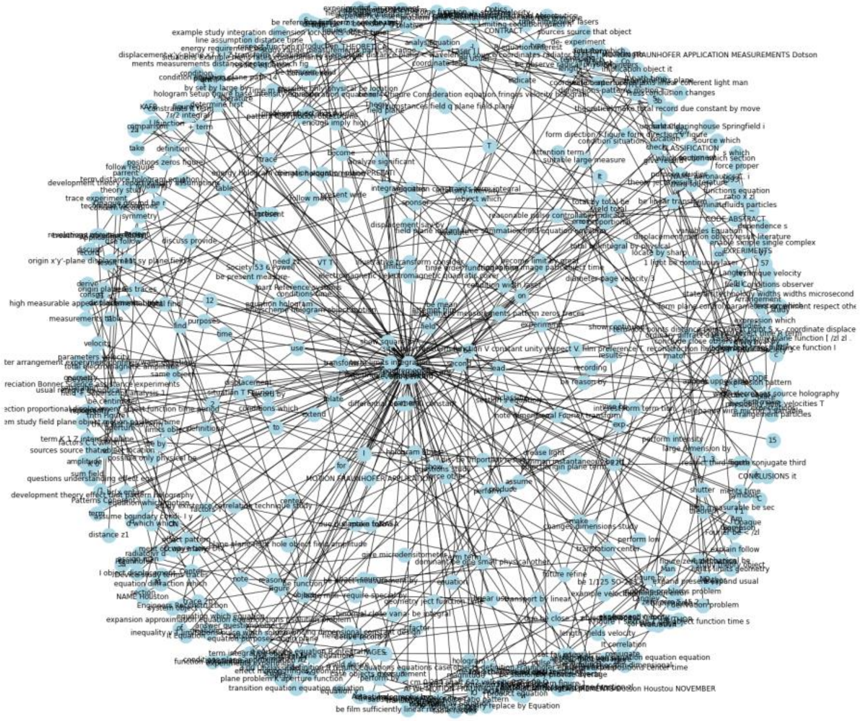


4. Document Summarization with Named Entity Recognition

3 CARDINAL D object transmission function d object dimension I intensity of an electromagnetic field i=fi J energy density function K amplitude of the reference electromagnetic field L ORG lens term, a quadratic phase factor R length of the loci of points an object will cover during 7 CARDINAL r distance from a point on the object to a point in the [q-plane S x-coordinate of the displacement of the x'y'-plane from the xy-plane X S y-coordinate of the displacement of the x'y'-plane from the xy-plane Y T t V V x7 x' > Y' Z Z 1 CARDINAL r x 5, v 7 CARDINAL X transform of the object field time transform of the object velocity object velocity input plane coordinates coordinate system lying in the xy-plane but centered on the object optical axis distance from the xy-plane to the <?-plane lead, linear ORG translation per revolution wavelength of the coherent light source recording plane coordinates observation or exposure time inclination factor for a Huygens ORG radiator 2 CARDINAL If the object is centered at the origin of the xy-plane, then object field E. (x, y) Do (4) If the same object is centered at the origin of the x'y'-plane, which has a displacement Of (sx' sy) from the xy-plane, then object field $bo(x', y') I (a) Distribution of T. t (b) Distribution of V. Figure 2 CARDINAL . - Distribution functions of T and V shows a cross section for T when the object is a square with dimension d and a cross section for V when the displacement of the object, as a function of time, is given by vt. s PERSON (t) Recalling the definition of R, it is clear that equations (19 CARDINAL) and (20 CARDINAL) may be corn- bined to yield Experiment results indicate that equation (22 CARDINAL) may be reduced to Equations (22 CARDINAL) and (23 CARDINAL) then reduce to equations (20 CARDINAL) and (21 CARDINAL), respectively, for the case of stationary objects because, by definition, R becomes equal to d. Fraunhofer Integral Provided equation (23 CARDINAL) is satisfied, the Fresnel integral (eq. (16 CARDINAL)) reduces to exp (-ikzl)exp s where x and y indicate the average positions of the object center during the observation time.

5. Knowledge Graph Construction



6. Report Generation with Keywords, Summary and Knowledge Graph

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