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Image Noise Detection By Image processing A Review Paper

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Abstract— Image are modified by the fuzzy filter we solve the problem in these paper . Image are taken by some leance here we used conical lens. Conical lens devices play vital role in our present technology. They can be used in various purposes. In devices using these lens can be nurtured or processed different ways which can give enhanced results for its operations. Techniques like image processing can be used to have a quality designed results. Using a fuzzy logic design it delivers better results while operating in night vision devices during heavy fog and rain.

Keywords— *Axicons; annulus; cone; eigen; fuzzy filter*.

I. Introduction

In image prossing image are damage by noise.Noise are very much affect in image this image are cliend by som filter method.One of the method is fuzzy filter .[4]Here we meanly focuses the fogy image that mean image are damage by the nature of fog .we are solve this problem by conical leance.Conical lens which followed by a conventional lens, it can focus laser light to a ring shape. An axicon will convert a parallel laser beam into a ring. Axicons are optical elements that produce Bessel beams, i.e., long and narrow focal lines along the optical axis. The narrow focus makes them useful in e.g. alignment, harmonic generation, and atom trapping, and they are also used to increase the longitudinal range of applications such as triangulation, light sectioning, and optical coherence tomography.

These lenses are normally manufactured as refractive cones or as circular diffractive gratings. They can also be constructed from ordinary spherical surfaces, using the spherical aberration to create the long focal line. The advantage of the lens axicon is that it is easily manufactured. Axicons can be manufactured in many different ways: as refractive of reflective cone axicons, as circular diffractive gratings, and as lens systems with spherical aberration. While an ordinary lens creates a point focus, an axicon produces focal lines extended along the optical axis.

II. Previous Work - The Theory submission

A. Different kinds of axicons

1. *Communication modes applied to axicons for image*

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The characteristics of the axicon focal line can be examined by the communication-mode method, which also gives physical insight into how the focal line is formed. The geometry of the axicon is different; the Eigen functions will be different . Using a change of variables, however, they can be found in a form very similar to those in Section.

2. *Exact modes*

In this approach, the communication modes were applied for the first time to the axicon geometry: circular or annular aperture to on-axis line focus. Previously, similar analysis had only been done in the two-dimensional case: from a line aperture to an on-axis region [101, 102]. The geometry is the same as in Fig1 . The transmitting region is defined as the annular aperture of the axicon, of inner and outer radii R_1 and R_2, while the receiving region is a section of the optical axis located between d1 and d2. [12-14]Here, d1 and d2 do not necessarily denote the ends of the focal line , as in the earlier section, but simply the limits of the receiving region. In order to observe the whole focal line, the limits should be placed outside the focal region. If the axicon is rotationally symmetric the angular part of the diffraction integral can be evaluated. For on-axis points, i.e., for $\rho = 0$, it becomes

$$U_{\mathrm{out}}(z) = \frac{k\exp(\mathrm{i}kz)}{\mathrm{i}z}\int_{R_1}^{R_2} U_{\mathrm{in}}(\rho)\rho'\exp\left(\mathrm{i}k\frac{\rho'^2}{2z}\right)\mathrm{d}\rho' \;,$$

(1)[6]

Where Uout(z) is the field on the optical axis and Uin(ρ') is the field leaving the axicon aperture. The phase function of the axicon is included in Uin(ρ'). After a change of variables $q = \rho'^2 - (R_1^2 + R_2^2)/2$ the integral reads[2]

$$U_{\mathrm{out}}(z) = \frac{k\exp(\mathrm{i}kz)}{2\mathrm{i}z}\exp\left(\frac{\mathrm{i}k}{2z}\frac{R_1^2+R_2^2}{2}\right)\int_{-Q}^{Q}\widetilde{U}_{\mathrm{in}}(q)\exp\left(\frac{\mathrm{i}k}{2z}q\right)\mathrm{d}q$$

$\widetilde{U}_{\mathrm{in}}(q) = U_{\mathrm{in}}(\rho)$ and $Q = (R_2^2 - R_1^2)/2$. Now the Green function is [8]

$$G(z,q) = \frac{k\exp(\mathrm{i}kz)}{2\mathrm{i}z}\exp\left(\frac{\mathrm{i}k}{2z}\frac{R_1^2+R_2^2}{2}\right)\exp\left(\frac{\mathrm{i}k}{2z}q\right) \;. \qquad (2)[7]$$

Most of the terms in the Green function are already separated in z and q, and can be excluded in the same way as the quadratic phase factors [5]. The remaining term $exp(i$kq/2z$)$ is expanded bi-orthogonally.[9-12] The Eigen values and the eigen functions, now with all terms included, are found to be[15]

$$g_n = i^{(n-1)}\sqrt{k\pi} \cdot |g_n| \,, \quad [8] \quad (3)$$

$$a_n(q) = \exp(-\frac{\mathrm{i}kD_{\mathrm{sum}}}{2}q)\alpha_n(q) \,, \quad (4)$$

[7]

$$b_n(z) = \frac{1}{z}\exp(\mathrm{i}kz)\exp\left(\frac{\mathrm{i}k}{2z}\frac{R_1^2+R_2^2}{2}\right)\beta_n\left(\frac{1}{z}-D_{\mathrm{sum}}\right) . \quad (5)$$

[6]

Here $D_{sum} = (1/d_1 + 1/d_2)/2$, $D_{diff} = (1/d_1 - 1/d_2)/2$, αn(q) is the PSWF of ordern, scale Q and bandwidth $kD_{diff}/2$, and $\beta n(1/z - D_{sum})$ is the PSWF of order n, scale D_{diff} and bandwidth $kQ/_2$. The accuracy of these expressions are confirmed by numerical propagation [3]. The results of direct evaluation of the diffraction integral, and the results from propagation using equations. (3)-(5), agree very closely. Interesting knowledge of the information content and the axial resolution can be found from these expressions [6]. The number of degrees of freedom, i.e., the number of available information channels, is

If the aperture of the axicon is increased, or the receiving region on the optical axis is increased, the number of modes will grow [3]. Thus more information can be transmitted in this particular geometry. It is also interesting to analyze the on-axis resolution.[14] A PSWF of ordern always passes through zero n times, and function number N is the most rapidly oscillating function which is propagated.[8] If the analysis is done in the variable[10]

$s = 1/z - D_{sum}$,

the distance between two adjacent zeros will be

$$\Delta s = 2D_{diff} \,/\, N = 2Y/\left(R_2^2 - R_1^2\right) \quad [6]$$

Changing variables to the z domain through the relation

$$\Delta s = 1/(z+\Delta z) - 1/z \quad [2\text{-}8]$$

Leads to

$$\Delta z = \frac{z^2\Delta s}{1 - z\Delta s} \,. \quad [9] \quad (7)$$

Since the highest on-axis frequency to be resolved is $fz = 1/\Delta z$, the axial resolution is

The value of fz depends only on the size of the aperture and on the position on the z axis [5]. There is no dependence on the chosen observation area between d1 and d2, which is reasonable since the resolution should not change just because a larger or smaller part of the axis is considered [2]. In Fig., the variation with z of the on-axis resolution is shown in conical lans.[13]

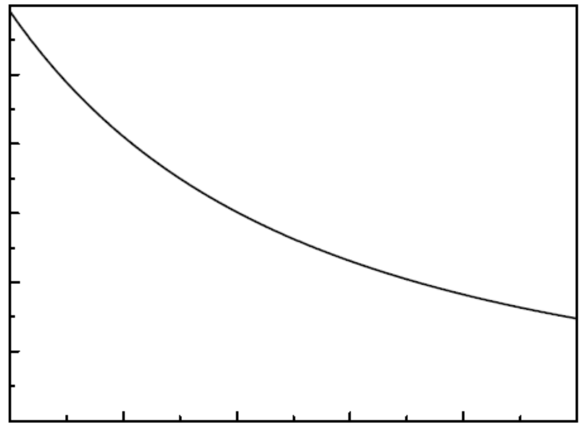

Fig. 3.The on-axis resolution changes with z according to Eq. (8). The radii are R_1 = 10 mm and R_2 = 5.0 mm, and the wavelength λ = 633 nm.[13]

It is well known that the depth of focus of a lens will increase if the focal length, and consequently the distance from the aperture, is increased. [10]An increased depth of focus means a decreased axial resolution, and since the analysis above applies not only to

axicons but also to lenses, it is reasonable that the resolution decreases when the distance to the axicon increases.

B. *Night Vision*

Night vision as referenced here is that technology that provides us with the miracle of vision in total darkness and the improvement of vision in low light environments [4].
This technology is an amalgam of several different methods each having its own advantages and disadvantages [3-9]The most common methods as described below are Low-Light Imaging, Thermal Imaging and Near-infrared Illumination [3]. The most common applications include night driving or flying, night security and surveillance wildlife observation, sleep lab monitoring and search and rescue [7]. A wide range of night vision products are available to suit the various requirements that may exist for these applications:[5]

1. WORKING PRINCIPLE:

This method of night vision amplifies the available light to achieve better vision [6]. An objective lens focuses available light (photons) on the photocathode of an image intensifier. The light energy causes electrons to be released from the cathode which are accelerated by an electric field to increase their speed (energy level). These electrons enter holes in a micro channel plate and bounce off the internal specially-coated walls which generate more electrons as the electrons bounce through [4]. This creates a denser "cloud" of electrons representing an intensified version of the original image. The final stage of the image intensifier involves electrons hitting a phosphor screen. The energy of the electrons makes the phosphor glow [3]. The visual light shows the desired view to the user or to an attached photographic camera or video device.[8] A green phosphor is used in these applications because the human eye can differentiate more shades of green than any other colour, allowing for greater differentiation of objects in the picture [2]. All image intensifiers operate in the above fashion. Technological differences over the past 40 years have resulted in substantial improvement to the performance of these devices. [5]The different paradigms of technology have been commonly identified by distinct generations of image intensifiers. Intensified camera systems usually incorporate an image intensifier to create a brighter image of the low-light scene which is then viewed by a traditional camera.[14]

All Gen 3 image intensified night vision products on the market today have one thing in common: they produce a green output image. But that's where the similarities end.[7]

2. CHARACTERISTICS OF NIGHT VISION

Using intensified night vision is different from using binoculars or your own eyes.[13] Objects that appear light during the day but have a dull surface may appear darker through the night vision unit, than objects that are dark during the day but have a highly reflective surface. For example, a shiny dark coloured jacket may appear brighter than a light coloured jacket with a dull surface [5].

Night vision is very responsive to reflective ambient light; therefore, the light reflecting off of fog or heavy rain causes much more light to go toward the night vision unit and may degrade its performance. A few black spots throughout the image area are also inherent characteristics of all night vision technology. [3-7]These spots will remain constant and should not increase in size or number [3]

III. PROPOSED WORK

We have seen very before that what is histogram and it's advantage to use. Now we have to go through some filter to eliminate the noise. By histogram we have already clear the picture by increase the contrast level of each and every pixel. Now we need work with that picture.[14] To eliminate noise we need to work with some filter.[8] But as per restriction we can't work with many filters in a single code. So at first I choose to develop a picture using most complicated logic, fuzzy logic.[9] As I say this logic is complicated but the facility to develop this code that it will work with some critical rule give us very respectful output. To process a fuzzy filter three steps is needed[11]

1. Smoothing,
2. Fuzziation,
3. Defuzziation.

To code this we need to follow the algorithm:

1. Take a zero size matrix according to the size of input image matrix.[9]
2. Find the derivative of the input image matrix. For this find the maximum number and minimum number and mean of the input image matrix.[14]
3. According to that derivative fire fuzzy rule.[4]
4. After doing this the new value of each block place in the new matrix containing zero.[7]
5. Convert the new matrix into uint8 and show the picture corresponding to that matrix.[5]

IV. FUZZY FILTER

Input image:

Fig 4 (see the picture through conical night vision)

Output image of fuzzy filter:

Fig 5 (after using fuzzy filter the image is like that)

A. Disadvantage of fuzzy filter:

There are several disadvantages in fuzzy filter:

1. This is too complicated. To code this it is needed to find out the fuzzy derivative. Then a bunch of rule should be thrown to fuzziation.[3]
2. After fuzziation it is needed to defuzziation. So from here we can understand this too much complicated rather than meadfilter, Gaussian filter, average filter.[8]
3. As this code is too much complicated it is required more than 10 sec to process an image.
4. As it is seen for faint foggy image this filter make image more noisy.[5]

B. Developed code of fuzz rule:

In conical lance we see the clear a picture but in night vision problem occur . Fast problem isIn night we see the object by conical lance no problem but when winter nite dip fog are falling Then vision are not cleared that time we have not see the object clearly . This problem I solved by fuzzy filter . Not only night in day when heavy fog fall that time same problem face.

Another problem is in night vision when heavy rain fall then also the object not see clearly . Then same problem occur . Not only night in day when heavy rain fall that time same problem face .This problem I solved by fuzzy filter .
Conical lens devices play vital role in our present technology.They can be used in various purposes.In devices using these lens can nurtured or

E. *HISTOGRAM :*

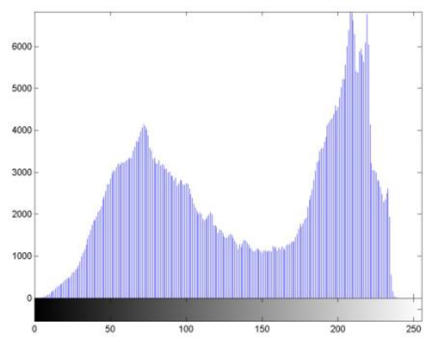

Fig 7 see the histogram

If in a camera we introduce a processer when a capture a picture, that picture pass through the processer. The processer follow the rule of fuzzy filter the fuzzy filter fast check the noise have found or not . If noise found then fiend noise and lock the noise and then remove the noise from the picture .

If noise not found then only picture passed form the processer. In processer call the fuzzy filter function and the fuzzy filter clean the noise from the picture . but total noise are not cleared some noise are cleared and the picture are far much better from original picture.

V. CONCLUSION

By the help of this developed algorithm many disruptions in its uses can be dealt. The advancement of this process further can lead to many fruitful results in upcoming technologies, as we can see after using this developed rule it gives us better results about what we are using so far in this field.

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