PerfectFocus

Project 2: Semester Project

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Abstract

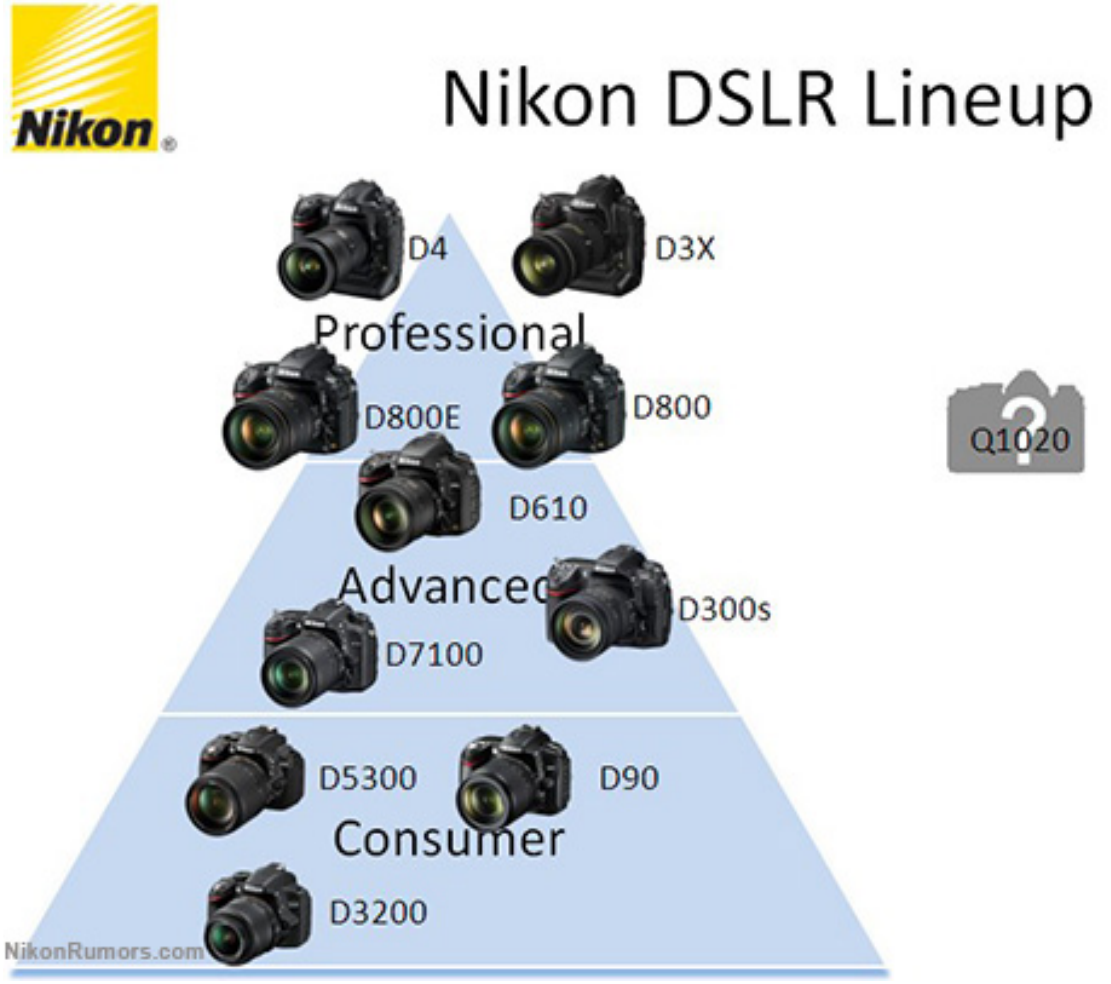
PerfectFocus is designed to make life easier with the user in mind. PerfectFocus delivers the simple but effective calculations for users to utilize. Depth of field and hyperfocal distance are concepts in photography that can be a little confusing. PerfectFocus simplifies that concept by applying a series of equations. The equations calculate the distance you must stand from your subject with your current camera settings to capture a needle-sharp focus. PerfectFocus will produce the near-distance, far-distance, hyperfocal point, and depth of field.

Introduction

I started photography 2 years ago and it is a great outlet for me to enjoy nature and the world around me while relieving stress. I am not alone in this regard; photography is steadily becoming more popular as the technology continues to advance. Although technology continues to develop, it still can't possibly calculate how far you must stand from a subject to perfectly focus a subject. Depth of field is an important concept to learn because it tells you exactly how far in length an image will be focused. It seems a little convoluted now but I will elaborate later in the write up. The concept of hyper-focal and depth of field was confusing to me but I knew it was important to learn to compose my pictures properly. The motivation to learn and compose better photographs lead me to the creation of PerfectFocus.

Literature Survey

The concept of this program is not new, but to provide a simple design with precise results is. Currently in the market, most cameras are equipped with auto focus, auto aperture, auto shutter speed but it does not tell you exactly what your depth of field is. If you know nothing of this concept and just go with the automatic settings, instead of operating the camera, the camera is operating you. Knowing your depth of field will change the and create more dramatic photographs.



Detailed System Description

User interactions: Program is executed

1- Choose Sensor Size
    1) APS/APS-C sized sensor
    2) 35mm Film Camera
    3) Input stored as circleOfConfusion
2- Current focal length
    1) Enter a focal length
    2) Enter a length between 8-2000
    3) Input stored as focalLength
3- Distance of the subject
    1) Enter the distance of your subject
    2) Enter a distance greater than 0.1
    3) Input stored as distance
4- Current aperture
    1) Enter current aperture setting also known as f/stop
    2) Enter a number range from 1.0 - 22.0
    3) Input stored as aperture

Hyperfocal Distance is calculated through the following formula:

((focalDistance * focalDistance) / (aperture*circleOfConfusion))

Near Distance is calculated through the following formula:

(hyperfocal * distance) / (hyperfocal - (distance - focalLength))

Far Distance is calculated through the following formula:

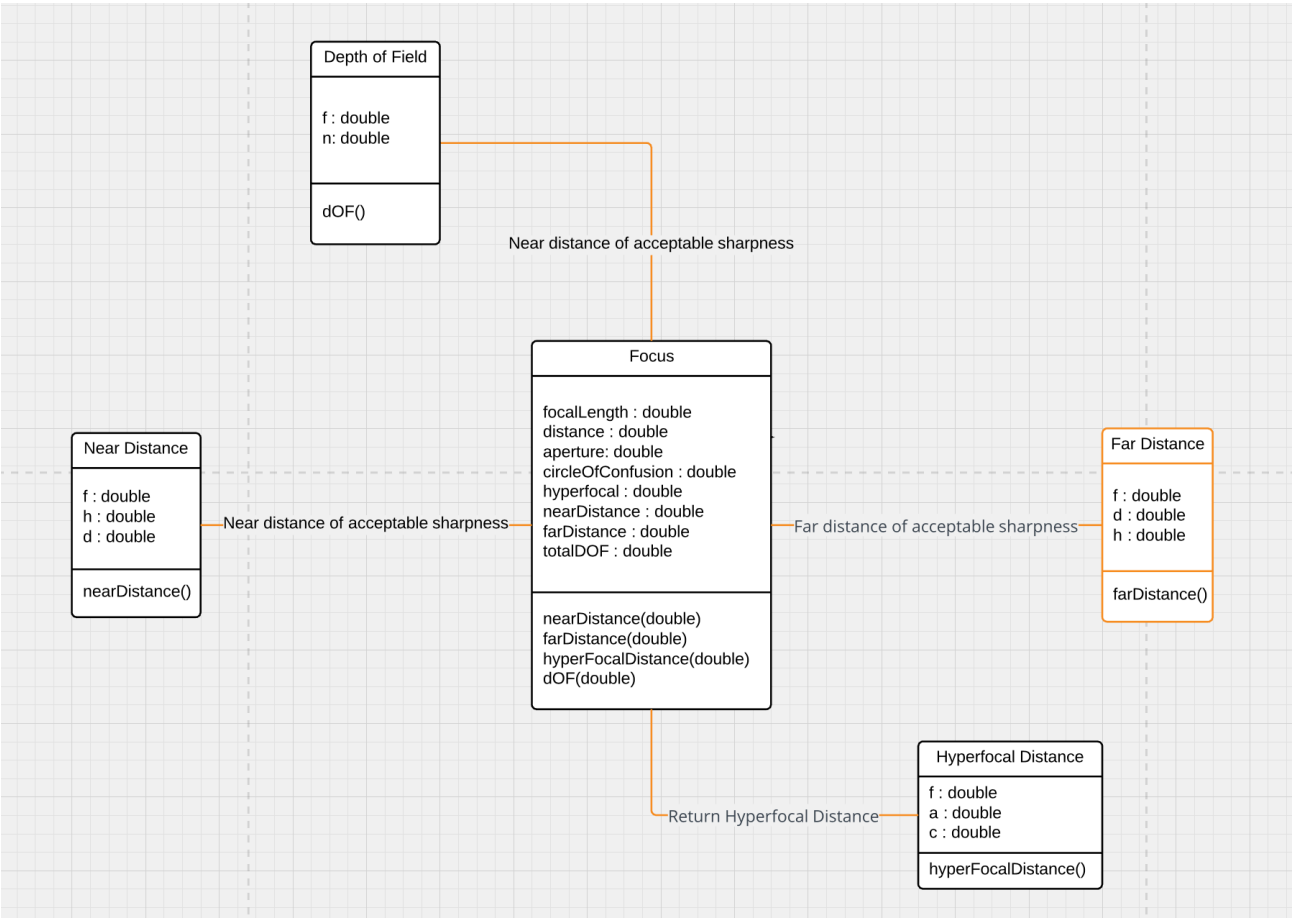
(hyperfocal * distance) / (hyperfocal - (distance - focalLength))

Depth of Field is calculated through the following formula:

(farDistance – nearDistance)

All inputs are recognized as length in millimeters. Therefore, final calculations must be divided by 304.80mm to provide the user with proper distance in feet.

UML


Depth of Field
f : double
n: double
dOF()
Near distance of acceptable sharpness
Focus
focalLength : double
distance : double
aperture: double
circleOfConfusion : double
hyperfocal : double
nearDistance : double
farDistance : double
totalDOF : double
nearDistance(double)
farDistance(double)
hyperFocalDistance(double)
dOF(double)
Near Distance
f : double
h : double
d : double
nearDistance()
Near distance of acceptable sharpness
Far distance of acceptable sharpness
Far Distance
f : double
d : double
h : double
farDistance()
Return Hyperfocal Distance
Hyperfocal Distance
f : double
a : double
c : double
hyperFocalDistance()

User Manual

Step 1: Sample answer provided (1)

```
Choose 1 or 2 :
 1) APS/APS-C sized sensor
 2) 35mm film camera.
1
```

Step 2: Sample answer provided (50)

```
What is the current focal length of your lens(mm):
50
```

Step 3: Sample answer provided (10)

```
How far is the subject you want in focus(ft)?:
10
```

Step 4: Sample answer provided (2.8)

```
From a range of 1.0 - 22, what is your current f/stop?:
2.8
```

Sample Result:

```
The hyperfocal distance is: 146.85 feet
The nearest distance your subject must be: 9.37 feet
The furthest distance your subject must be: 10.72 feet
Actual distance of focus is: 1.35 feet
```

Conclusion

In conclusion, the purpose of PerfectFocus was to provide the user vital information required to understand and create amazing in focus photographs. It provides the user an understanding of what hyperfocal distance, near distance, far distance, and depth of field is and the relationship they have with one another. Understanding these concepts will provide a solid foundation for all future photographers.

References

Allen R. Greenleaf, *Photographic Optics*, The MacMillan Company, New York, 1950.
Alfred A. Blaker, *Applied Depth of Field*, Focal Press, 1985.

Kerry, G. (2012). How to calculate Depth of Field. Cameradojo.com The Digital Photography School. http://cameradojo.com/2012/10/22/20121022how-to-calculate-depth-of-field/, 2017