Fisheye Image DeWarping

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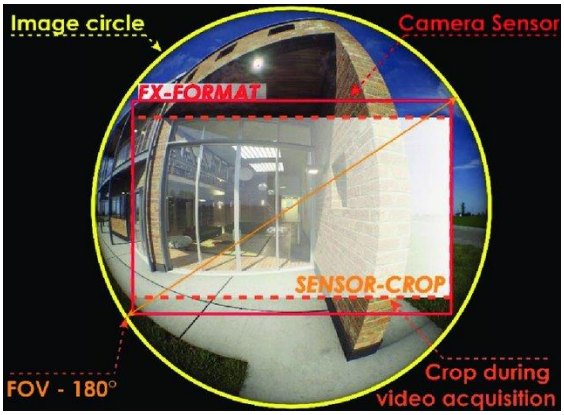
Abstract

Fisheye dewarping is a remedy of twists of pictures acquired from a camera outfitted with a Fisheye focal point. Different strategies for numerical adjustment of contorted pictures are utilized for dewarping. The after effect of the dewarping is a picture with fixed lines and with objects that look normal [1]. The appropriate response is a fisheye impact camera! Fisheye or as they are additionally called all encompassing cameras offer you a lot more extensive field of view than fixed cameras, ordinarily up to 360 degrees. A panoramic camera is intended to catch a round trip [1]. Generally, they are introduced on the roof gazing directly down so it can catch, record, and replicate full point of view. By the by, utilizing a clarified fisheye camera picture may be entirely awkward. With regards to proficient video recording, such picture should be decoded. This interaction is called dewarping [1]. It permits the bended fisheye impact to become rectified so it appears as though an ordinary camera's picture.

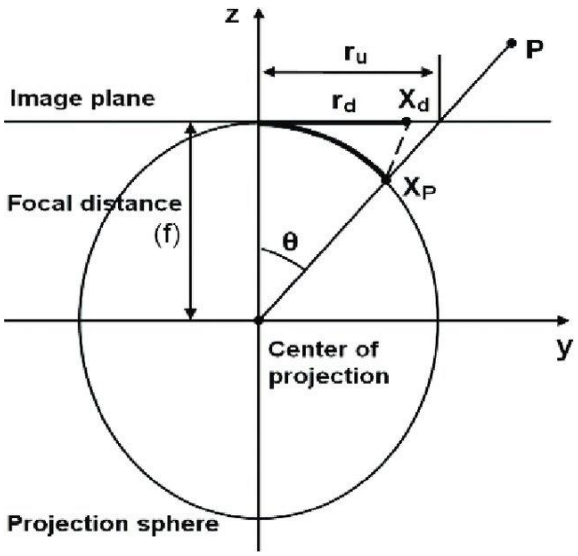
Keywords: Image Dewarping, Fisheye Camera, Focal Point, Video Recording

1. INTRODUCTION

A fisheye focal point is an ultra wide-point focal point that produces solid visual contortion planned to make a wide all encompassing or hemispherical picture. Fisheye lenses achieve extremely wide angles of view. Fisheye focal points likewise have different applications, for example, re-projecting pictures that were initially shot through a fisheye focal point, or made by means of computer created illustrations, onto hemispherical screens [2]. Fisheye focal points are likewise utilized for logical photography like recording of aurora and meteors. They are maybe most ordinarily experienced as peephole entryway watchers to provide the client with a wide field of view. In a round fisheye focal point, the picture circle is recorded in the film or sensor region; in a full-outline fisheye focal point the picture circle is encompassed around the film or sensor region [2].



Fisheye Camera Mode [3]



Fisheye Camera Block Diagram [4]

2. Xilinx PYNQ Board Configuration:

PYNQ is an open-source project from Xilinx that makes it simple to configuration inserted frameworks with Xilinx Zynq SoCs. Utilizing the Python language and libraries, developers can take advantage of the advantages of programmable rationale and microchips in Zynq to fabricate more skilled and invigorating inserted frameworks.

- Accessing The Board:

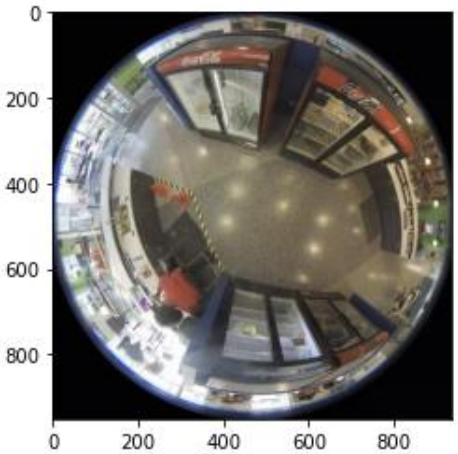
  - Connect the board with the power cable.
  - Connect the ethernet cable to the router to form a LAN connection.
  - Wait till the red light turns yellow. The red light is located just besides the SD Card. If it turns yellow, it means it is reading the data from SD Card.
  - As soon as it gets connected, we need to go to our admin panel of our router and check which Ip address is assigned to your PYNQ device. For me it is 192.168.1.122.
  - It will open Jupyter Notebook and we can code in python.

Note: Only if we connect our ethernet cable to the router we will be able to get internet connection. For direct connection, you will not get internet.

3. Proposed Algorithm:

- Step 1: We constructed a map for Fisheye Dewarping to calculate the width and height of the original image.
- Step 2: We need to make use of sin and cos functions in python and we need to calculate this using two nested loops, for height and width.
- Step 3: The formula for generating map is **B + count(height) / height * subtract * sin(theta) or cos(theta)** where theta is **(count(width) – offset) / width * 2 * 3.14**.
- Step 4: Sin and Cos functions will generate map_a and map_b respectively.
- Step 5: We need to calculate the final image size by cropping the shape of both width and height.
- Step 6: We then passed the cropped width and height in the map function by calling the same.
- Step 7: Then, rotate the image to 180 degrees so that image straightens up.
- Step 8: Finally, Call the main method and input the image, we will crop the image from bottom by 40px and we are passing 1500 value as offset. Offset can be manipulated on trial-and-error basis whichever output is preferable.

4. Output Screenshots:



Original Image

Fisheye Dewarped Image

5. Conclusion:

Xilinx PYNQ can be used by embedded system software developers such as framework planners who need a simple programming interface and system for quick prototyping and advancement of their Zynq. Programming engineers who need to exploit the capacities of Xilinx stages without utilizing ASIC-style configuration devices to plan hardware. Jupyter Notebook joining in Xilinx PYNQ board gives us intuitive environment in which we can code using python with all the given hardware libraries. Adding to that, fisheye cameras are useful when users need to review a wide region utilizing a solitary focal point camera. Be that as it may, checking the camera stream can be confusing as the camera video will seem twisted when at first survey the camera. We have implemented Fisheye dewarping for an image in this project. Fisheye dewarping means the original 360 image will be converted into the big panoramic image using all the mathematical methods. Fisheye dewarping applications are utilized all around the world in computerized cameras, cam recorders and so on so higher resolution pictures can be caught in fisheye focal points and converts it into dewarped picture.

References:

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