FABRICATION ANALYSIS FOR CORNER IDENTIFICATION USING ALGORITHMS INCREASING THE PRODUCTION RATE

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Abstract - Objective: This paper can be very useful for removing noise from digital images using median filtering techniques of rectangular digital images. The corner defect detection from algorithm is very helpful for maintaining quality of ceramic tiles. This algorithm is very helpful for detection of corner defect from rectangle ceramic tile. The comparative analysis can be used four factors these are: accuracy level, consistency level, complexity of time and production rate. By using these four factors can prove this algorithm can better than previous method. In our proposed method or algorithm can using nine sample digital image of rectangular shape. These nine image run on the platform of MATrix LABoratory and finding the corner defect. If each corner is equal to 90 degree means this type of ceramic tile belongs to normal ceramic tiles. This algorithm and quality maintaining model of machine is very helpful for ceramic tile industry for maintaining quality of ceramic tiles.

Keywords: RGB Digital Image, Gray Scale Digital Image, Median filtering, Salt and Pepper digital noise, Mean filtering techniques.

1. Introduction

Image processing is an approach for transformation of an image into digital image and applying few operations on it, to get it we extract of some important information from the image [1] [2]. Usually image processing approach applies for two and three dimensional images [3]. Now at present or upcoming technologies rapidly growing, uses of an image processing, now it is used at everywhere like business industry, medicine manufacturing [6], ceramic industries etc. The image processing is used in research for research, scientist and engineering in the computer science and many other areas. Image processing classified into three ways for processing of any image [4] [5]. First way, in this we capturing the image from real time sensors or image scanner or digital camera [9], second way in the image we are manipulated, image enhancement, compression of image, feature extraction from the image of ceramic tiles, third way for generate the result we applying different analysis or developing an particular algorithm on the image [7]. Image processing used in various applications like Glass manufacturing, cloth and yarn industry, Ceramic tile manufacturing [8] for controlling the quality factor, Animation for movies and cartoon, offset printing, Forensic laboratory, drone aircraft, Expert system designing, Artificial intelligence, Global positioning system (GPS).

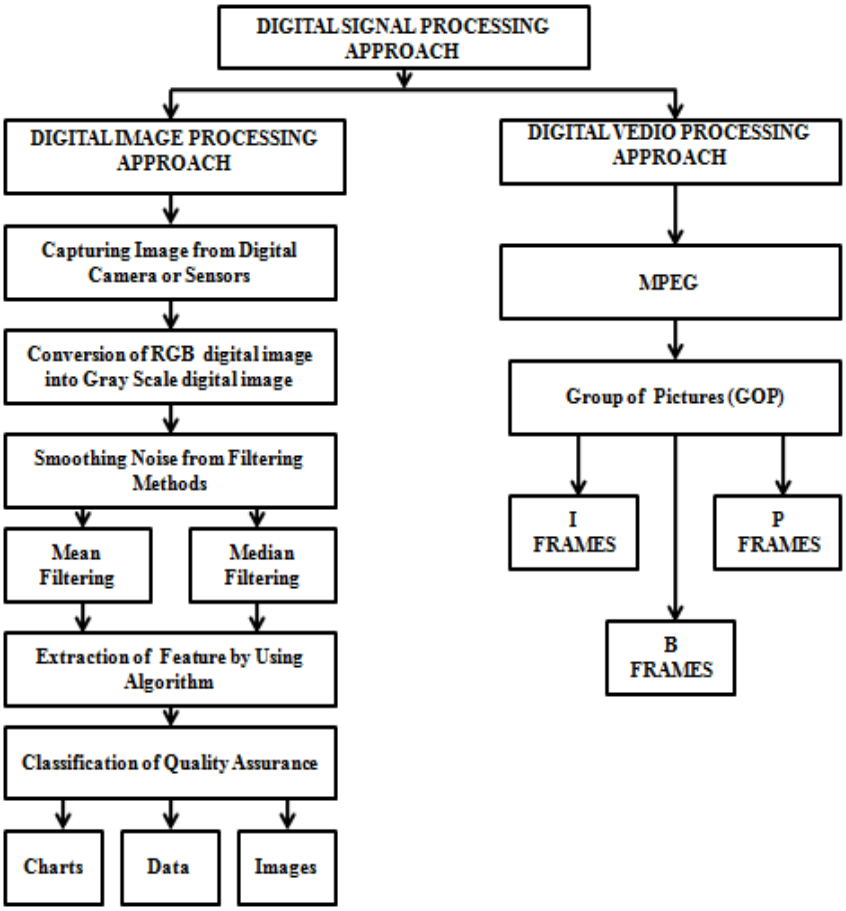

Figure 1 Classification of Digital Signal

2. UAHQMM Model Machine

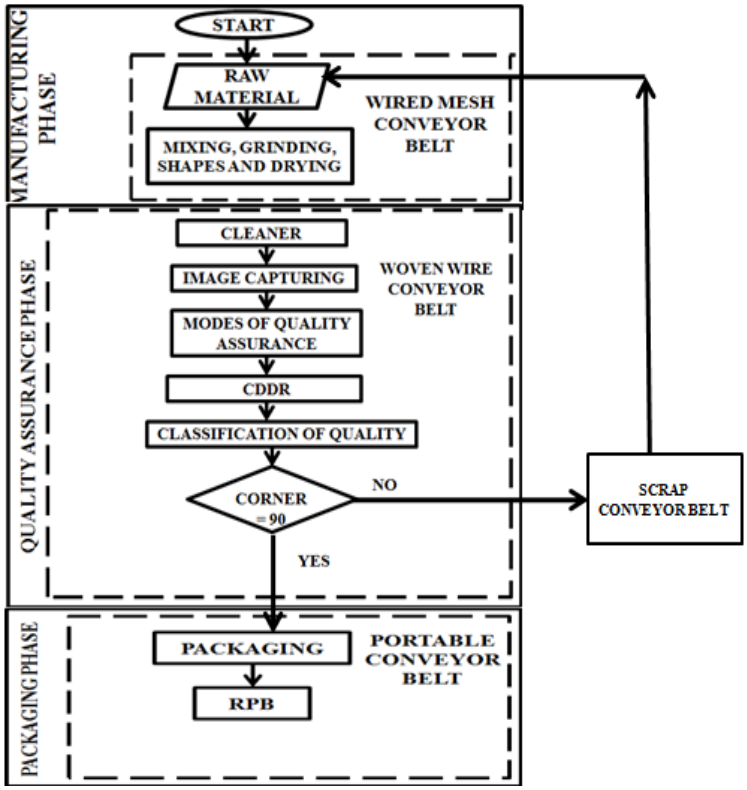

Figure 2 Flow Chart of Model Machine

The model machine names is UAHQMM (Upgraded Automated High Quality Maintaining Machine) is fully automatic machine there is no any participation of human being in this. This modeled machine can be divided into three phases: The classification of these three phases proves this model machine that named UAHQMM is fully automated machine this is given in flow chart

3.1 Manufacturing Phase:

It is first phase of UAHQMM (Upgraded Automated High Quality Maintaining Machine) this phase start after collection of raw material from different types of resources. After collecting of resources the first phase of manufacturing will be start. This phase divided into four stages: Mixer, Grinder, Shapers and Drying, Wired mesh conveyor Belt.

3.2 Quality Assurance Phase

This is second phase of UAHQMM (Upgraded Automated High Quality Maintaining Machine). In first manufacturing phase from raw material converted into different shapes of ceramic tiles. After converting different shapes some of defect are generating in and found in the ceramic tile. Thus these types of defect detection by our proposed model of machine that maintaining the quality of ceramic tile. The Quality Assurance Phase can be divided it into six stages: Cleaner, Image Capturing, Computer Vision of Digital Image, Modes of Quality Assurance, Classification of Quality, and Woven Wire Conveyor Belt.

3.3Packaging Phase

This is third phase of UAHQMM (Upgraded Automated High Quality Maintaining Machine). Last phase of proposed model is Packaging phase after passing this phase the ceramic tile reach at the customers for used in construction for decoration. The packaging phase can be divided it into two stages: Portable Conveyor Belt, Packaging.

3. CDDR ALGORITHM

This algorithm named is CDDR (Corner Defect Detection of Rectangle Ceramic Tile) it is the mode of UAHQMM (Upgraded Automated High Quality Maintaining Machine). In this proposed algorithm of rectangle ceramic tile corner defect detection can helpful for deciding or providing better result than previous algorithm[10]. We compare with existing algorithm for finding Corner Defect Detection of Rectangle Ceramic.

3.1 Block Diagram of CDDR algorithm

The block diagram of our proposed algorithm CDDR has seven steps.

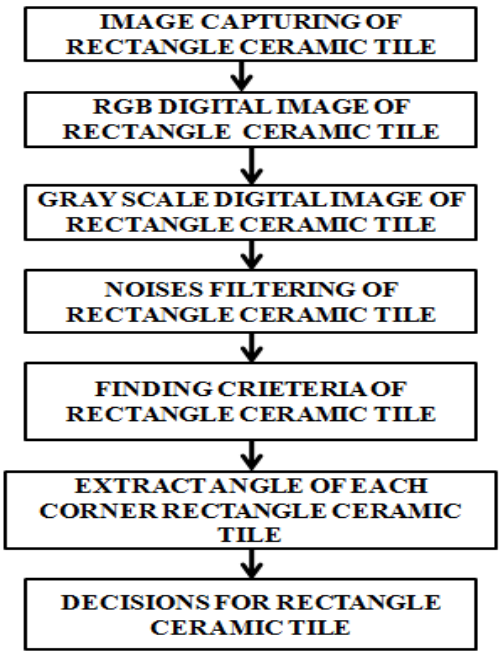

Figure 3 Block diagram of CDDR algorithm

3.2 Flow Chart of CDDR Algorithm

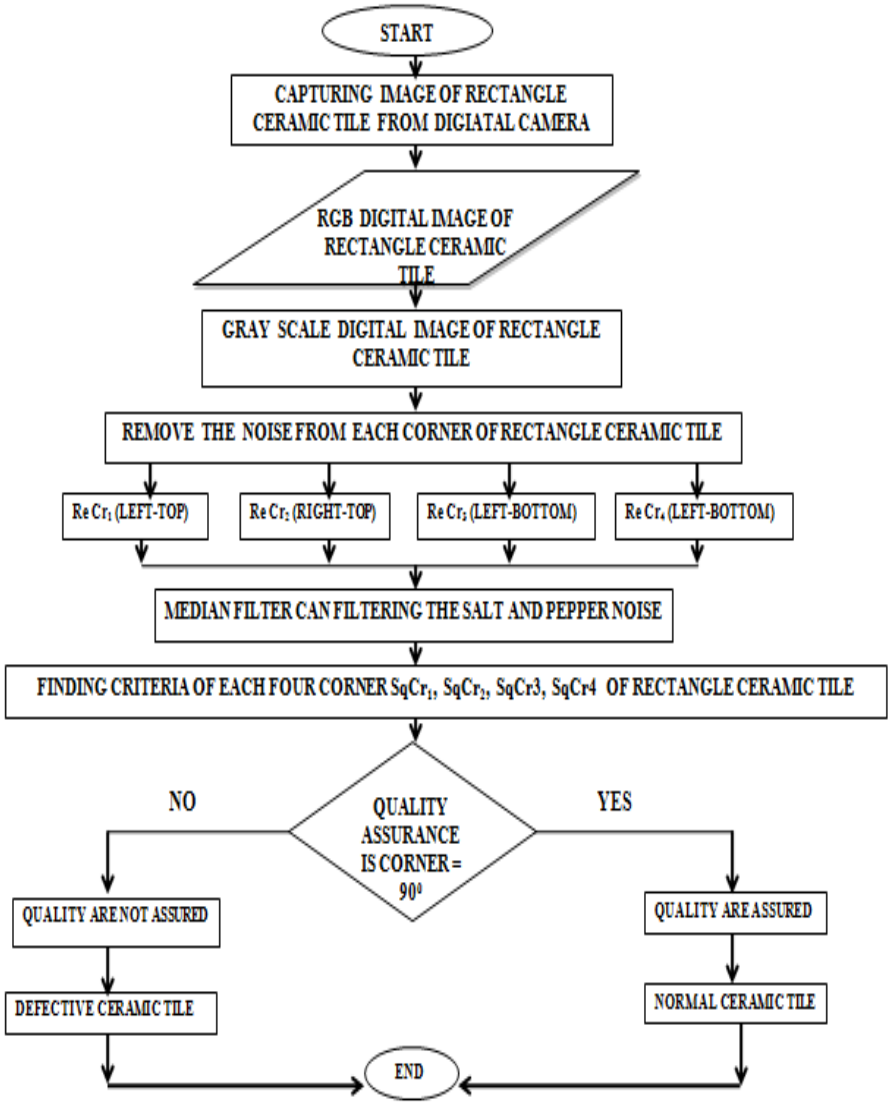

Figure 4 Flow Chart of CDDR

In flow chart we describe each and every steps of CDDR (Corner Defect Detection of Rectangle Ceramic Tile) algorithm. The flow chart given in Figure 3, the flow chart is a way for inputting data, processing and generate a desired output of rectangle ceramic tile. Each flow chart has basically model is based on IPO (Input Processing and Output) cycle. This flow chart can describe how we detect corner defect detection from different types of rectangle image that we capturing from digital camera this digital camera name is **KEYENCE CV 5000** of two camera can captured the RGB (RED GREEN BLUE) digital image these two cameras named P_0 AND P_1. P_0 can capture upper part of ceramic tile or upper two corners are Rec Cr_1Left Top and Rec Cr_2 Right Top and P_1 can capture lower part of ceramic tile or lower two corners are Rec Cr_3 Left Bottom and Rec Cr_4 Right Bottom. In this way we captured RGB digital image. RGB digital image is input of digital cameras CDDR algorithm flow chart. After this step we converted the RGB digital image into Gray Scale digital image. The main reason behind for converting the RGB Rectangle digital image into Gray Scale Rectangle digital image is if we filtering or smoothing noise found in image, thus many number of noises pixels stored in blue color and less number of pixels can stored in Red and Green color thus we converted the image into Gray Scale Digital image. In gray scale digital image we easily smoothing the noise because there are only two colors found in this type of image. White pixels can represents by '1' and black pixels can represents by '0'. In rectangle ceramic tile everyone knows four corners we remove each and every corner of ceramic. Rec Cr_1 (Left – Top) where Rec represents Rectangle ceramic tile, Cr_1 refers first corner that is intersection point of Left and Top part of ceramic tile. Rec Cr_2 (Right – Top) where Rec represents Rectangle ceramic tile, Cr_2 refers second corner that is intersection point of Right and Top part of ceramic tile. Rec Cr_3 (Left – Bottom) where Rec represents Rectangle ceramic tile, Cr_3 refers third corner that is intersection point of Left and Bottom part of ceramic tile. Rec Cr_4 (Right – Bottom)

where Rec represents Rectangle ceramic tile, Cr_4 refers forth corner that is intersection point of Right and Bottom part of ceramic tile. For filtering each corner we use non linear filtering method called median filter. By this filtering method we remove salt and pepper noise from rectangle digital image of ceramic tile, the salt refers '1' or white color pixel and pepper refers '0' or black color pixel. Next step is initializing the value of each corner of rectangle ceramic tile. We compare each four corner of rectangle ceramic tile is equal to 90^0 or not. If corner is not equal means is represents the quality are not assured means it belong to defective rectangle ceramic tile. If corner is equal means it represents the quality is fully assured means it belong to normal rectangle ceramic tile. After this we end the process in this way the CDDR flow can very helpful for finding corner defect from Rectangle ceramic tile.

Algorithm of CDDR

Step: 1 Image capturing of rectangle ceramic tile.

Step: 2 RGB digital images (RDI) of rectangle ceramic tile

STEP: 3 Gray Scale Digital Images (GDI) Of Rectangle Ceramic Tile

Step: 4 Noises Filtering of Rectangle Ceramic Tile

Step: 5 Median Filters Used In Digital Rectangle Image

Step: 6 Finding Criteria of Rectangle Ceramic Tile

Step: 7 Angle Extractions from Rectangle Ceramic Tile

4. Experimental Result

We use nine sample rectangle digital images in figure 4. These nine sample rectangle digital images can see the different results. The CDDR algorithm codes of corner defect detection from rectangle ceramic tile can run using the platform of MATLAB R2001a (MATrix LABoratory). In this we compare four features: first is increase accuracy level, second increase consistency level, third decrease the complexity of time and forth increase the production rate. By using four factors we prove our proposed algorithm of corner defect detection from rectangle ceramic tile is better than existing algorithm [10].

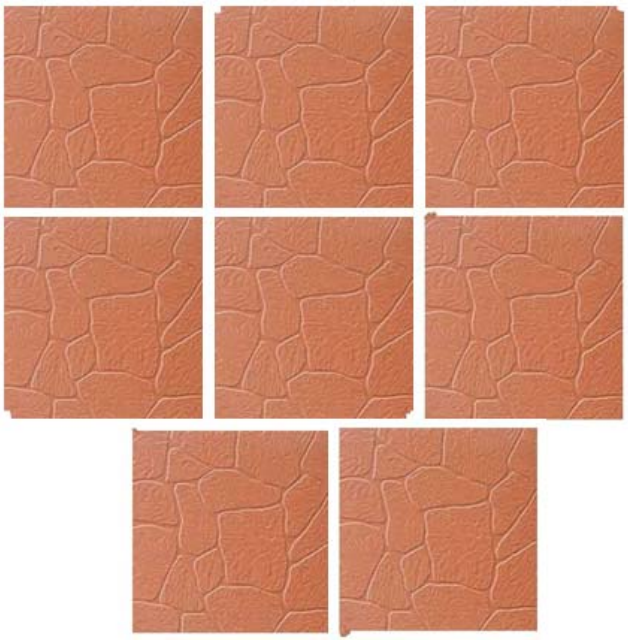

Figure 5 Sample Ceramic tiles

5.1 Comparison of Accuracy level

When we compare the level of accuracy the corner defect detection form rectangle ceramic tile than we find our proposed algorithm names CDDR algorithm that proves better accuracy level than the existing algorithm

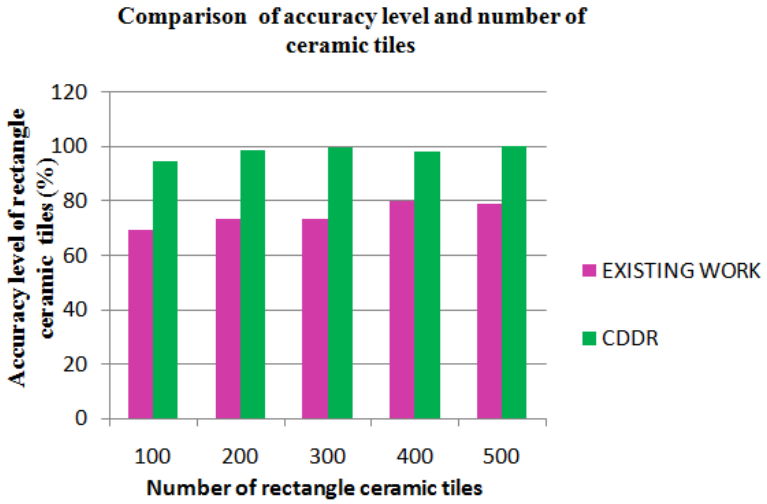

Figure 6 Comparison using bar graph for accuracy level existing work and our proposed work

Table 1 Comparative analysis of accuracy level in existing work and CDDR

S.NO	NUMBER OF CERAMIC TILE	Total Accuracy level of Rectangle Ceramic tile (%)	
		EXISTING WORK	CDDR
1	100	69.347	94.243
2	200	73.257	98.648
3	300	73.432	99.621
4	400	79.991	97.839
5	500	78.998	99.832
	AVERAGE	75.005	98.0366

The average accuracy level of corner defect detection form rectangle ceramic tiles of existing method is 75.005 percent approximately and our proposed algorithm CDDR accuracy level is 98.0366 percent approximately. When we compare average accuracy level, then we find a big gap of accuracy level in existing method and CDDR algorithm.

5.2 Comparison of Consistency level

When we compare the level of consistency the corner defect detection form rectangle ceramic tile than we find our proposed algorithm names CDDR algorithm that proves better consistency level than the existing algorithm [10].

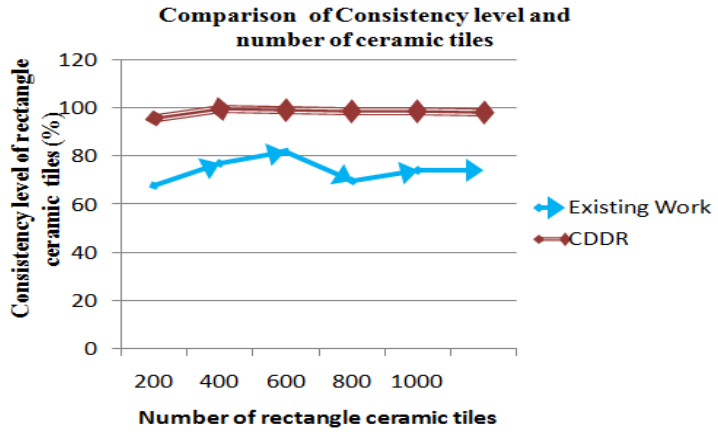

Figure 7 Comparison using line graph for Consistency level existing work and our proposed work

Table 2 Comparative analysis of consistency level in existing work and CDDR

S.NO	NUMBER OF CERAMIC TILE	Total Consistency Level of Rectangle Ceramic Tile (%)	
		EXISTING WORK	CDDR
1	200	67.962	95.999
2	400	76.999	99.532
3	600	81.961	99.102
4	800	70.001	98.891
5	1000	74.012	98.682
	AVERAGE	74.187	98.4412

The average consistency level of corner defect detection form rectangle ceramic tiles of existing method is 74.187 percent approximately and our proposed algorithm CDDR consistency level is 98.4412 percent approximately. When we compare average consistency level, then we find the existing method consistency level is suddenly rise or fall there is any stability for Corner Defect Detection of Rectangle Ceramic Tile. Today everyone know then sudden change are not allow for future marketing for maintaining the quality is important thing at present time. As according to present or future demand wants that consistency level of Corner Defect Detection of Rectangle Ceramic Tiles is stable and there is no big change.

5.3 Comparison Complexity of time

When we compare the complexity of time the corner defect detection form rectangle ceramic tile than we find our proposed algorithm names CDDR algorithm that proves reduce complexity of time than the existing algorithm[10].

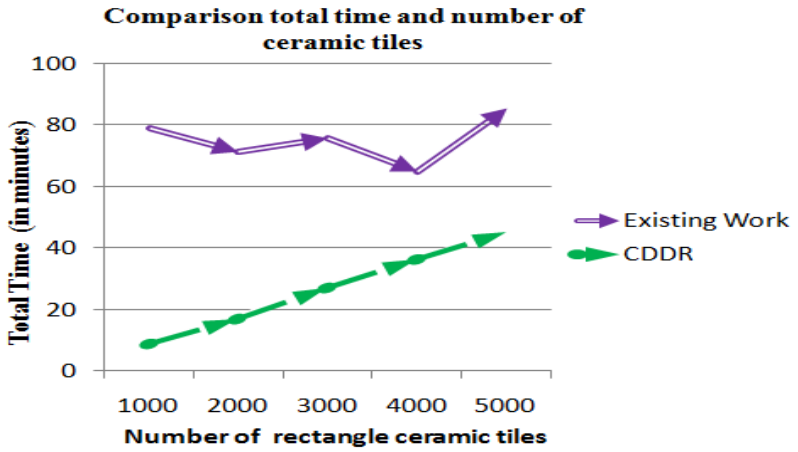

Figure 8 Comparison using line graph for Complexity of time existing work and our proposed work

Table 3 Comparative analysis of Complexity of time in existing work and CDDR

S.NO	NUMBER OF CERAMIC TILE	Total time required in ceramic tiles for corner defect detection (in minutes)	
		EXISTING WORK	CDDR
1	1000	79.352	8.967
2	2000	71.63	16.893
3	3000	76.001	27.101
4	4000	65.046	36.215
5	5000	85.534	44.997
	AVERAGE	75.5126	26.8346

The average complexity of time of corner defect detection form rectangle ceramic tiles of existing method is 75.5126 minutes approximately and our proposed algorithm CDDR accuracy level is 26.8346 minutes approximately. When we compare average complexity of time, then we find a big gap for complexity of time in existing method and CDDR algorithm.

5.4 Comparison Production rate

When we compare the production of rate the corner defect detection form rectangle ceramic tile than we find our proposed algorithm names CDDR algorithm that proves excellent production rate than the existing algorithm [10].

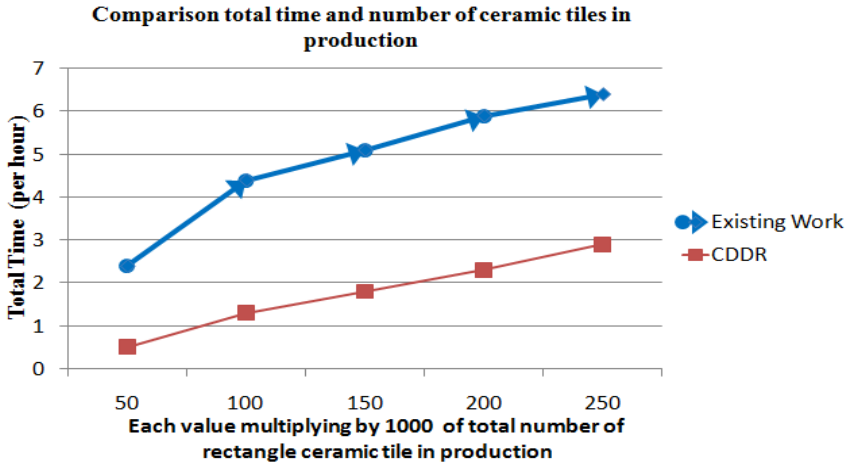

Figure 9 Comparison using line graph for Production Rate existing work and our proposed work

Table 4 Comparative analysis of Production Rate in existing work and CDDR

S.NO	NUMBER OF CERAMIC TILE	Total Production Rate of Rectangle Ceramic tile (in per hour)	
		EXISTING WORK	CDDR
1	5000	2.4	0.5
2	10000	4.4	1.3
3	15000	5.1	1.8
4	20000	5.9	2.3
5	25000	6.4	2.9
	AVERAGE	24.2	1.76

When we compare average production rate, then we find a big gap of production rate in existing method and CDDR algorithm. The average production rate of existing method is 24.2 hours can take time in 25000 thousand after detection Corner Defect Detection of Rectangle Ceramic Tile. Our proposed algorithm the average production rate of CDDR is only 1.76 hours can take time in 25000 thousand after detection Corner Defect Detection of Rectangle Ceramic Tile. Thus our proposed algorithm CDDR can provide good production rate than existing work.

5. Conclusion

In production of ceramic tile industry can used this model of machine UAHQMM (Upgraded Automated High Quality Maintaining Machine) that can provide better results for finding corner defects detection from rectangle shape ceramic tiles. Thus according to CDDR (Corner Defect Detection of Rectangle Ceramic tiles) we detect 99.9 percent corner defect detection from rectangle shape of ceramic tiles. Thus using by this algorithm and model machine can better results than existing algorithm and increase the production rate.

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