|  | Vidyavardhini’s College of Engineering & Technology |
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| Department of Computer Engineering |

**Aim:**  To implement Character Generation.

**Objective:**

Identify the different Methods for Character Generation and generate the character using Stroke

**Theory:**

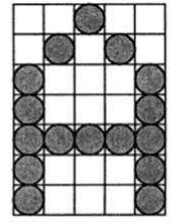
**Bit map method –**

Bitmap method is a called dot-matrix method as the name suggests this method use array of bits for generating a character. These dots are the points for array whose size is fixed.

∙ In bit matrix method when the dots are stored in the form of array the value 1 in array represent the characters i.e. where the dots appear we represent that position with numerical value 1 and the value where dots are not present is represented by 0 in array.

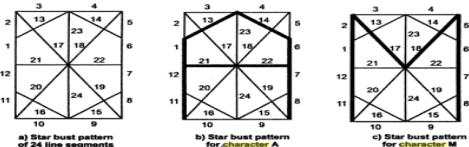
∙ It is also called dot matrix because in this method characters are represented by an array of dots in the matrix form. It is a two-dimensional array having columns and rows.

A 5x7 array is commonly used to represent characters. However, 7x9 and 9x13 arrays are also used. Higher resolution devices such as inkjet printer or laser printer may use character arrays that are over 100x100.



**Starburst method –**

In this method a fix pattern of line segments is used to generate characters. Out of these 24-line segments, segments required to display for particular character are highlighted. This method of character generation is called starburst method because of its characteristic appearance. The starburst patterns for characters A and M. the patterns for particular characters are stored in the form of 24 bit code, each bit representing one line segment. The bit is set to one to highlight the line segment; otherwise, it is set to zero. For example, 24-bit code for Character A is 0011 0000 0011 1100 1110 0001 and for character M is 0000 0011 0000 1100 1111 0011.



**Program:**

#include<stdio.h>

#include<conio.h>

#include<graphics.h>

void main()

{

int gd=DETECT,gm;

int i,j,k;

int a[10][10]={

{1,1,1,1,1,1,1,1,1,1},

{1,1,1,1,1,1,1,1,1,1},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0}

};

int b[10][10]={

{0,1,1,1,1,1,1,1,1,0},

{1,1,1,1,1,1,1,1,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,1,1,1,1,1,1,1,1},

{1,1,1,1,1,1,1,1,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1}

};

int c[10][10]={

{1,1,0,0,0,0,0,0,1,1},

{1,1,1,0,0,0,0,0,1,1},

{1,1,1,1,0,0,0,0,1,1},

{1,1,0,1,1,0,0,0,1,1},

{1,1,0,0,1,1,0,0,1,1},

{1,1,0,0,0,1,1,0,1,1},

{1,1,0,0,0,0,1,1,1,1},

{1,1,0,0,0,0,0,1,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,0,1}

};

int d[10][10]={

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{1,1,0,0,0,0,0,0,1,1},

{0,1,1,1,1,1,1,1,1,0},

{0,0,1,1,1,1,1,1,0,0}

};

int e[10][10]={

{1,1,1,1,1,1,1,1,1,1},

{1,1,1,1,1,1,11,1,1,1},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{0,0,0,0,1,1,0,0,0,0},

{1,1,1,1,1,1,1,1,1,1},

{1,1,1,1,1,1,1,1,1,1}

};

initgraph(&gd,&gm,"C:\\TURBOC3\\BGI");

for(k=0;k<5;k++)

{

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

if(a[i][j]==1)

{

putpixel(200+j,200+i,WHITE);

}

}

}

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

if(b[i][j]==1)

{

putpixel(220+j,200+i,WHITE);

}

}

}

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

if(c[i][j]==1)

{

putpixel(240+j,200+i,WHITE);

}

}

}

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

if(d[i][j]==1)

{

putpixel(260+j,200+i,WHITE);

}

}

}

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

if(e[i][j]==1)

{

putpixel(280+j,200+i,WHITE);

}

}

}

}

getch();

closegraph();

}

**Output -**



**Conclusion:**  Comment on

1. different methods:

Bitmap method:The bitmap method in character generation represents characters as grids of pixels. This technique is used for digital typography and graphics, but it lacks scalability compared to vector-based approaches. Bitmap fonts are an example of this method.

Starburst method:The "starburst method" in character generation typically refers to a technique used to create stylized or decorative characters by radiating lines or strokes outward from a central point, giving the appearance of a starburst or radiating pattern. This method is often used for artistic or ornamental text, logos, and graphics to make characters stand out and appear visually striking. It involves creating characters with lines or strokes that extend in various directions from a central point, creating a dynamic and eye-catching effect. The starburst method is not typically used for standard text or font rendering but is instead employed for creative and decorative purposes.

Stroke method:The stroke method in character generation involves adding an outline or border, known as a "stroke," around the edges of characters or shapes. This stroke can vary in thickness, color, and style. It is commonly used to enhance the visibility and contrast of characters, making them stand out from the background, especially when displayed on complex or textured surfaces. The stroke method offers design flexibility and can be employed for artistic or decorative purposes, allowing for creative choices in typography and graphic design. However, using excessively thick strokes may reduce legibility, particularly in smaller text sizes, which is a potential limitation of this technique.

1. advantage of stroke method:The stroke method in character generation involves outlining characters with a stroke or border, offering several advantages. Firstly, it enhances character visibility, especially on complex backgrounds, making text more readable. Secondly, it provides design flexibility by allowing variations in stroke width, color, and style, making it versatile for logos, headlines, and artistic text. Thirdly, stroked characters scale well without losing quality, ensuring readability at different sizes and resolutions. Additionally, the method creates contrast and can be used to highlight specific character elements. Lastly, it adds an aesthetic dimension, making it suitable for creative and visually appealing designs in various graphic and typographic applications.
2. one limitation:One limitation of the stroke method in character generation is that overly thick strokes or borders can reduce legibility, especially at smaller font sizes, as they may cause characters to appear bulky and crowded. Careful consideration of stroke width and design is required to maintain readability, and this method may not be suitable for all types of fonts or characters, particularly those intended for small text or fine print.