

# The Application of Image Processing Technology in the Landscape Design

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**Abstract.** Computer aided landscape design because of its modification convenient, drawing quick beautiful garden design characteristics has become a mainstream technologies. Today, methods applied in landscape design can be mainly divided into two classes: one is application of GIS technology; the other is application of traditional imagery processing software. The former mostly used in a wide range of areas, scenic spot planning design, can create real terrain, landscape and background, geographic data management and analysis. And the latter more widely used in garden plan, elevation drawing, section plan and rendering, can draw more beautiful. Firstly, this paper analyzes the landscape design drawings of classification, computer drawing and hand plot of the advantages and main drawing software, then, expounds the key technologies in the landscape architecture image processing, which are various gallery system establishing, scenic spot planning and all kinds of green spaces design, landscape rendering making.

**Keywords:** image processing, landscape architecture, design, digital image, application

## 1. Introduction

Landscape design creates natural and recreational environment within certain region, by transforming terrain, transplanting the plant, build building and decorating garden road way. It's a kind of science technology which is closely related with human survival environment.

The landscape designer is completely understood by people through all kinds of design drawings. Designers did manual charting initially. With the development of computer technology, computer aided landscape design gradually become the mainstream for its convenient, time-saving characteristics, and the digital image processing technology of blueprint drawn by computer drawing become the key factors which influence the quality of landscape design drawings .

## 2. Introduction of Landscape Design Image Processing

### 2.1. Classification of Landscape Design Blueprint

- Horizontal plan: Horizontal plan is the view produced by normal projection in horizontal direction within the scope of landscape design, which mainly expresses projects land building area, road width and layout, afforest decorate, the location and type of water, environmental details and position of facilities, ground paving, etc. It is the most common way in landscape design and is one of the most critical drawings in designing scheme, enlarging early design and documentation stages plan. It mainly includes analytical horizontal, Environment plan and plant layout etc.
- Elevation: Garden elevation refers to the view in horizontal direction perpendicular to the surface of landscape garden design. Landscape elevation mainly expresses the undulating height change and terrain landscape design content such as architecture, rocks, structures and sketch of the detailed dimension and relationship.

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- Sectional drawing: Garden section is the view by removing the cut part after splitting the botanical garden with an imaginary horizontal plan. It mainly shows the terrain ups and downs within the range of landscape design, the change of elevation, water width and depth and shape of encircle materials, indoor height of building or structure, roof form, the steps height, etc.
- Effect drawing: Effect drawing mostly means perspective drawing which is a kind of techniques converting three-dimensional form into two-dimensional form through perspective principle. Effect drawing can stereoscopic the planed horizontal scheme on the vision to verify its effect. Perspective drawing will give the customer a Direct-viewing feeling so that to communicate easily.
- Construction drawing: Construction drawing is the construction basis. It describes the detailed construction craft, material workmanship, internal and external shape, structure, etc. Documentation must comply with relevant drawings and craft standard such as the national building standards.

## **2.2. The Contrast Application of Computer Graphics and Hand-Paint Chart**

Design is a procedure in which the designers try to find out the problem and solve the problem. In the earlier period of design, the concept is fuzzy and perceptual, and the designers have the strong randomness. They noted down the worthwhile idea with the hand-painted sketch. It shows the vividness and promptness in design proposal optimization and design concept exchange. Its disadvantage lies in labor intensity, long manufacture time and not easy for storage and revision.

Computer graphics solve the problems above and produces fine, high accuracy drawings. With the application of computer software image synthesis, image processing, special effects can be created which hand plot can't match. But long-term solely mechanical operation computer is very easy to make a rigid design model and writing off the artistic quality of design creation process.

Computer graphics and hand plot has its advantages and disadvantages. The landscape design should be combined with landscape design features closely, foster strengths and circumvent weaknesses. As in analytical horizontal plan hand plot do great help in determination of design proposal. Subsequent environmental layout, section and rendering can be made computer drawing accurate base map, and then in hand-painted for polishing, consummation, then put them into computers for the final image processing. Owing to its specific characters like accuracy, computer drawing is of vital important for garden construction.

## **2.3. Main Softwares for Garden Image Processing**

- AutoCAD (hereinafter referred to as CAD): AutoCAD developed by American Autodesk Company is the preferred core software for landscape design. It has powerful 2D graphics editing functions and the strong 3D drawing and solid modeling functions. AutoCAD produces vector diagram of which the major characteristic is to produce all sorts of edited line---linear, round, text and dimensions .It has many other editing functions like copy, pruning, mirror and rotation. Which are used primarily to draw landscape plan, elevation, section and construction drawing etc that give garden figure priority to line.
- 3DMAX (hereinafter referred to as 3D): 3DMAX is professional 3d animation software with modeling and rendering, animation synthesis function, riches in model, texture, lighting and synthesizer. In the 3d modeling, the path lofting, section lofting deformation, strips modeling functions can make up for the deficiency of CAD. When modeling for abstract sculpture, various structures, it has a stronger function; the particle system in simulating eruptive fountain, running water performs well.
- Photoshop (hereinafter referred to as PS): Photoshop widely adopted image processing software. It can be used to editing 3DMAX texture, adjusting color and foil atmosphere. In the schematic stage borrowed materials like existing building, rock, water, and fountain shorten the submitted time. For general demand scenes can paste, depict the existing materials. This software can reach the final working sketch by doing the synthesis processing the preliminary rendering and plant, character, traffic tools, background etc.
- Related softwares: In addition to the software mentioned above, geographical information system (GIS), Coreldraw, LANDCADD, 3DLandscape, YLHCAD software are also adopted because of their features in certain aspects.

### 3. The Digital Image Processing of Landscape Architecture

#### 3.1. Establishment of Various Gallery System

Before making garden figure, its better to collect to establish various elements of the gallery system, which is helpful for rapid, beautifully completing image processing and of great significance. Different software needs different atlas type. Different gallery systems can be established on the basis of relevant factors like mountain, stone, plants, architecture, sculpture and sketch. Detailed classification gets the higher drawing processing efficiency.

- CAD: CAD software can do the independent drawing for various tree planar illustrations, facade, rock, green space pavement modelling or construction structure of 2-d or 3-d graphics rendering, and save for DWG format. The file can insert any CAD file as vector diagram block freely. It's convenient and quick. CAD can also be inserted bitmap, but it can't matches vector diagram owing to its limitation. It can't match the vector chart in effect. Except figure block material, Atlas still has a detail drawing, space of material, CAD model, etc.
- 3D: 3D software atlas includes 3D models, 3D lamplight, 3D material, 3D texture mapping etc. Better file format is mat.
- PS: PS software atlas includes various later atlas (file format is tga, jpg, etc), PS tiff filters and PS brush etc.
- GIS: GIS software atlas includes sub-map storage, linear library, design repository and color library, etc.

#### 3.2. The Image Processing in Scenic Spot Planning

Scenic spot refers to the areas which have scenic resource concentration, excellent surroundings, a certain scale and visit conditions, and offer visitors with leisure entertainment or scientific cultural activities. Owing to the large regional scale, complex topography and geomorphology, much data contained in drawing. Scenic spot planning is usually completed with MAPGIS software combines RS technologies.

- Base map input: Scenic spot represent the bitmap formed with line got through remote sensing technology, symbols and colors planning basic map is more formed. For computer recognize them easily, we should digitize them firstly. The process is as follows: Open MAPGIS system graph input in digitized meter, input the point element, the line element parameter designed based on the design requirement and the scale. And then digitize the elements. In this process, basic map elements as general attractions, scene and range bound, highway, rivers, scenic spots, can be directly digitize to form dot, line files.
- Landscape shows and graphics: Graphical editing input can improve accuracy, enrich graphics drawing expressive, but it is the technical difficulties how to enable graphic design possesses both the practicability and the best effect is making such figure. Take broad-leaved forest landscape for example, in the editing system click the function ---"Build arc three spots" to realize broad-leaved forest landscape object line shown with arc or semicircle line. The concrete method is as follows: When after the three circular function is chosen, input a sealing ring along scenic area surrounding which is docking in head and tail, different in size orderly in fluctuation. Then connected all the arcs into a curve which achieves both landscape design demand and image reflects of the forest characteristics.
- Topology processing, color design: In order to create particular atmosphere, image need to carry on the color scheme after editing. Save the lines with completed color after lamination as a document, open the "line transfers the arc" in the "other" menu and save it as a surface chart document. To make it fill color automatically, click the topology reconstruction system. Then choose the proper color based on the standards of the landscape design. Such as dark green for coniferous forest, light green for broad-leaved forest so that shows the characteristics of obvious color level and tonal harmony of plant landscape.
- Image superimposition: To make natural landscape more natural, superposition method of landscape photos is commonly used landscape designing. Firstly process the photos with Photoshop and save it

as TIF format. Then find the image insert function in editing menu and inset the photo based on its size and parameter. Browsing pictures under the editing condition with the reductive display function.

### **3.3. Processing of all Types of Plane, Elevation and Profile in Urban Green Space**

This type of image can be completed with CAD - PS software.

- **Vector chart drawing:** Vector chart drawing is completed with CAD software. According to the design concept of drawing design sketches, various of all kinds of elements like size and the relative position relationship is determined. CAD software provides various command tools, such as "Point", "Pline", "Copy", "momentary", "Mirror" etc. for landscape drawing. When we draw garden road in landscape design, we can render control points "Point" firstly, then connects with "Pline" command, finally produce width of road. With the "Insert" order, we can insert trees, rocks, etc directly into the block which great saves drawing time. CAD software provides a layer editing functions in which we can do sectorization, road laying, plants planting etc. And output monolayer or multi-layered.
- **Handling of over-worshipping effect:** Drawing processing is done by following the process: Open CAD, input graphics into PS software. Find the relevant real-life scenery picture such as grassland, warts, water shape, select defined imaging pattern in the edit menu, click the packing button to make it true. Software PS is divided into several layers according to need and for the convenient operation, each of them can do the independent edition. Some objects which have certain height like buildings, trees, etc. can be edited to show layer shadows, enable graphic more visualized. Numerous filters in P S software like distortion, fuzzy and texture bring unique effect. Plane, elevation and section is drawn based on scale, so make sure every part like compass, scale is correct and complete before the final chart is fixed.

### **3.4. Effect Drawing Processing**

- **Modeling:** Landscape rendering are mostly carried on in 3D software. Common sketch architecture, ground planning, roads, etc. are easily done by adding some modification command in 3D software. Terrain establishment can be carried on with contour line in "Terrain". Curved road production is difficult to deal with. The common method for it is adopting Shapemerge "command" firstly, then projection plugin to create a curved surface. Water body is simply processed with merely one planar establishment. Creation of plants which have several shapes and planes mainly follow two ways as below: One is three-dimensional plant model in the system, another kind is the created right-angled intersection "Box" of which the thickness is "0". The height is determined by "Box".
- **Material offered:** Object texture colors are influenced by materials offered. Texture changes and the variation of material parameters create almost everything like ground, wall, sketch, etc. Most of the landscape material objects can be shown through "Bitmap" and the water body materials can be shown accurately with "Bump" and "Box".
- **Lamplight camera:** Light which have overall scene for environment can show many kinds of effect like day and night scenery. In daytime, overall environment lighting consists of "Target Direct" (Simulated sunlight), "Omni" and a "Skylight". The camera is equivalent to a different point, confirm the final rendering type.
- **Rendering:** When the scene tunes into rendering stage, different points of view images can be rendered through the camera. Rendering is carried on with TIFF format. This format advantageously removes the shadow in PS software by adding "Alpha".
- **Later effects processing:** 3D software has many unfinished rendering as plant, sky, character and so on, which need to be processed in later. Effect drawing is the reference for the other objective view's perspective effect. When dealing with the different materials, the unity of the whole picture of the light, tonal and style need to be taken into consideration except considering position, height and measurement of different objects.

## 4. Landscape Architecture Image Processing Development Prospects

The development of landscape architecture image processing technology reduces the designers' labor intensity, ensure the design and offer the prompt revision. Electronic document is convenient for communication, torage and application. Compared with hand-paint, it lacks of artistry. But it can be solved in the near future with the development of Graphics with no sense.

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