Animation VR Scene Stitching Modeling Based on Genetic Algorithm

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The process of seamlessly combining many Virtual reality (VR) scenes to create a continuous and engaging VR experience is known as VR scene stitching. It comprises stitching together several scenes or locations to provide smooth transitions between them without any noticeable seams or interruptions. Each VR scene is carefully designed and created, focusing on certain areas, objects, or events within the virtual environment. To enhance the expertise based on the already employed animation VRSSM (VR scene stitching modeling), more research is conducted on the animation VRSSM in conjunction with Genetic Algorithms (GA). The approach uses a wavelet transform (WT) to recover the scene's low- and high-frequency components for use in animation. Splicing criteria for the high-frequency coefficients are determined by comparing and filtering the convolution outcomes from 2 GA pattern operators. The GA sharpness assessment function and the 8 neighborhood local variance are used to determine the splice procedure for the low frequency coefficients; to produce the mosaic modeling of the stitching scene; the inverse WT is utilized. The subjective and objective assessment approaches are used together to examine the experimental outcomes. The data demonstrate that the GA achieves a higher quality splice (0.38) than the traditional splicing modeling. Rich edge information and great scene clarity are benefits of animation scene splicing modeling. The method suggested in this study outperforms the standard algorithm in terms of both qualitative and quantitative evaluation, and its implementation yields a potent synergistic impact on VR scene stitching.

Povzetek: Raziskava izboljšuje združevanje VR scen z uporabo genetskih algoritmov in valčne transformacije, kar omogoča kakovostnejše in bolj jasne prehode med scenami.

1 Introduction

Animation VR scene stitching is the act of smoothly fusing several VR scenes to provide a continuous and immersive VR experience. It entails sewing together distinct scenes or settings to enable seamless transitions between them without any obvious seams or disturbances. Designing and Creating Scenes Each VR scene is uniquely planned and developed, focused on certain spaces, items, or occasions inside the virtual setting. The size, difficulty, and substance of these scenarios might vary. The locations inside each scene where transitions will take place are designated as transition points. Any structure that makes it easier to go from one scene to another may serve as a transition point, including doors, portals, elevators, and other structures [1]. Overlapping and lining up maintain seamless stitching; scenes must overlap when they change. Aligning the objects and details that will be seen in both scenarios is crucial. This alignment aids in fusing the scenes invisibly. Pay close attention to preserving visual coherence across scenes. To prevent abrupt variations across stitched scenes, elements like lighting, textures, colors, and shadows should all be constant [2]. Effortless Change to produce seamless transitions between VR scenes, many approaches are used to gently fade out one scene and gradually fade in the next. Dissolving Use a dissolving effect to gently switch between scenes; it is similar to fading but includes extra animation features. Masking: To help the viewer concentrate and create a seamless blend, use dynamic masks to cover and show various elements of the scene as the picture changes. Test the VR experience extensively to find any obvious seams, misalignments, or inconsistencies after piecing the scenes together. Continue to iterate and improve the stitching procedure until the experience is seamless and the transitions are smooth. The planning and design of the individual scenes or shots take place at the pre-production stage of the VR experience. This includes creating 3D models, animating characters or objects, and setting up the virtual environment. With the use of a virtual camera, each scene or shot is recorded. The user's viewpoint and point of view inside the VR experience are determined by where the camera is placed [3]. The process of rendering includes creating the finished pictures or frames using 3D models, textures, lighting, and other components. The goal of the stitching procedure is to provide seamless transitions between the various scenes. Depending on the intended outcome, this may be done in a variety of ways. Fading in and out, blending between scenes, and the use of visual effects like particle effects or distortions. Stitching programs the different scenes are pieced together using specialized computing techniques. With the use of these tools, creators may align and organize the scenes, manage transition times, and perfect the VR experience as a whole. Adobe Premiere Pro, Autodesk Maya, and Unity are a few of the most well-known VR scene-stitching applications [4]. Testing and enhancing the VR experience are evaluated after the scenes are combined to make sure the transitions seem seamless and natural. Testing and user input might assist in finding any problems or areas that need improvement. The scene stitching, camera motions, and other components may all be adjusted as needed. Biological evolution and natural selection served as inspiration for the computer method known as GA. It may be used to animation to create or improve animations according to a set of predetermined standards. To identify the precise animation issue to resolve or improve, define the problem. This might include activities like procedural animation, object animation, or character motion creation [5]. Animations are represented by encoding as a collection of parameters or genes. Keyframes, motion curves, control points, and other pertinent animation elements may be among these characteristics. An initial population of animation solutions is created by population initializations. A collection of starting animations, each represented by a matching parameter set, is generated or chosen at random in this process [6]. Fitness Assessment Create a fitness function that measures each animation's performance relative to the specified criteria. The fitness function may be based on physical reality, aesthetic appeal, or any other relevant metrics. Use a selection procedure to choose the population's most promising people (animations) based on their fitness ratings. Better solutions are indicated by higher fitness ratings. Use selection techniques like roulette wheel selection or tournament selection [7]. To produce offspring, combine or cross-pollinate the chosen animations. To produce new animations with distinct properties entails fusing the parameters or genes from two or more parent animations. Mutation Change or modify the settings of the offspring animations at random. To avoid the algorithm from converging too fast to inferior answers, this aids in exploring fresh regions of the solution space. The population update replaces the population's least-fit members with their freshly produced offspring animations. As a result, the population will grow over time and provide better animations [8]. Decide on termination conditions for the genetic algorithm, such as a target fitness threshold or a limited number of generations. Up until these requirements are satisfied, the algorithm will continue to evolve the population. Take the animation(s) from the final population that has the greatest fitness score once the algorithm has finished running. These animations show the created or optimized answers to animation issues [9]. A search and optimization method called a GA draws inspiration from natural selection and evolution. It's used to discover approximations of answers to optimization and search issues. An initial population of potential solutions, often represented as a collection of binary strings or chromosomes, forms the basis of the method. Every chromosome stands for a possible answer to the issue at hand. After that, the population changes throughout some generations [10]. The procedure begins with the generation of a population of arbitrary people (chromosomes). Evaluation Depending on how successfully each member of the population solves the task, they are each given a fitness value and assessed. The evaluation criteria are specified by the fitness function, which also establishes the value of each solution. The future generation is created by choosing people from the present population. Individuals with better fitness levels have a higher chance of getting picked during the selection process, which is often based on fitness values. Fitter people are more likely to be picked for reproduction in this process, which is comparable to natural selection [11]. Crossover and mutation procedures are used to accomplish this. To create one or more children, a parent pair must combine their genetic material via a crossover, while a mutation adds random alterations to the offspring's genetic makeup to preserve variety. The new children make up the future generation by replacing certain members of the present population. Based on elements like age or fitness, a replacement may be made.

Up until a termination condition is satisfied, the algorithm iterates through the selection, reproduction, and replacement processes [12].

To enhance the expertise based on the already utilized animation VRSSM, further research is conducted in partnership with GA.

2 Related works

Article [13] proposed a model for the development of panoramic views of exposition halls and a strategy for integrating the lessons learned from designing virtual reality displays into the layout of these spaces. This work will employ the fundamental procedures of GA to solve the Traveling Salesman Problem (TSP) issue to automatically produce the ground contour for a building since there is a significant degree of resemblance between the optimum simple polygon formed by plane discrete corners and TSP. According to the findings, this algorithm requires less time to complete than the feature-point-based approach. Research [14] will optimize a common evolutionary algorithm, and investigational simulation, and determine that the resulting reproduction is more novel than the innovative technique by fusing the languages of traditional Chinese painting and digital image production. Research has both a propagandistic influence on traditional Chinese painting styles and a theoretical foundational role in the growth of digital illustration in China. As the popularity of online communities and cutting-edge illustration techniques have grown, so too has the importance of digital illustration technology in contemporary graphic design. Beginning with the assumption that illustration is an art form in the digital era, this research examines how digital illustration is used and encourages the creative expression of graphic design in China to advance.Article [15] investigated the Snake model-based optimization approach for real-time collision detection in the context of huge information. It is anticipated that with the use of big information technologies, the speed and accuracy of the Snake model's collision detection in real-time would increase. For better collision detection, the authors of this research suggest a multiline swarm particle swarm technique and integrate it, into a novel model. It checks the competence of conventional methods and validates their detection performance. The classic evolutionary algorithm is woefully inadequate for this challenge, prompting the development of the optimization target algorithm. Evolutionary computing has shown to be a reliable and flexible global optimization tool. Self-organization, adaptability, and the ability to learn are all features. It is not constrained by the specifics of the issue at hand, and it may deal with complicated situations that are challenging for conventional optimization procedures.In research [16], an optimization search method is proposed using a genetic evolution search technique. In keeping with the artistic aspect of root-cutting art, they further explore its ecological aesthetic features. The method finds comparable locations in the sample surface and replicates them in the product picture to create a surface that is visually consistent with the original. Among the many uses are photorealistic and photorealistic rendering, picture restoration, and CAD. With the use of previously collected texture data, a synthetic version of the texture covering a much larger region may be generated. Texture may depict the intricate surface aspects of an item or explain a wide range of natural events with recurring characteristics. Despite its ups and downs during its more than two-thousand-year history, the craft of root carving has its distinctive allure due to its features of both use and artistry, as well as the cohabitation of reputation and stylishness. The search for the best matching block may be completed more rapidly, leading to more accurate synthesis results, if a better matching block can be located.Utilize 3D visual communication content creation, server processing, and client processing to amass animated film and television clips. 3D vision projects animation videos using stitching, projection mapping, and texture synthesis of animation video picture frames. The scaling factor field is designed to provide a smooth transition between scaling factors for neighboring triangles in animated and video graphics. Visual communication is used in conjunction with deep learning to extract deep features and rebuild multi-frame animation and animated video pictures. The recommended method can significantly improve how animation video images are visually propagated. The experimental findings demonstrate the effectiveness of the suggested strategy in accelerating the precise reconstruction of video images and enhancing the visual transmission of animation clips [17]. In the article [18], they introduce the "Tower Crane Intelligent Lifting Path Planner" (TCILP) for navigating difficult lifting settings. The setting might be anything from a brand-new warehouse to a decrepit factory that has been there for decades. These locations are notorious for either lacking usable digital models or being impossible to render in 3D. Using state-of-the-art laser scanning technology, the study creates a "virtual" replica of a physical location, such as a factory or building site. The difficulty is in processing the massive information put of summit exhaust from several scans to create a full VR. To better design routes, they also simulate the tower crane.Article [19] uses the process of making "Tai Chi" animation to demonstrate how picture stitching technology may be used to ease the process of making animation textures for 3D models. Images are taken with a handheld camera in an area where there will be some overlap. After a cylinder is projected into the picture, the Harris method is used (it is based on scale space) to locate key places in the image, the 2 way normalized cross-correlation technique is utilized to find points of similarity between the 2 images, and the threshold T is extracted repeatedly to eliminate any remaining mismatches. Through the enhanced RANSAC method, the transformation parameter model is swiftly calculated, and the reassembled picture is projected and transformed. Experiments with real data in Matlab confirm that the suggested picture splicing approach improves the quality of panoramic photographs while increasing efficiency.Research [20] investigated the core technology of three-dimensional modeling in the context of virtual and augmented reality, developing a three-dimensional texture calculation method for use in texture analysis that enhances the realism of surface patterns and styles for the benefit of both experience and design. Users' interactions with the planned environment are so intuitive that a feeling of substitution emerges in the setting. Movement is tracked in real-time, allowing users to freely explore virtual environments and interact with others in the same way they would in the real world. The 3D intelligent interactive display system allows users to interact with a human-machine interface in three dimensions, combining movement with visual immersion to spark creativity. Anime is used to provide the necessary descriptions since it not only accurately depicts the event's progression but also presents a more realistic image and helps broaden the mental horizons of a group's collective behavior. The search performance of the algorithm is enhanced to some degree by utilizing convergence and divergence behavior in a social learning mechanism, as well as by expanding on previous work that analyzed the benefits and drawbacks of the artificial fish swarm algorithm. The enhanced artificial fish swarm method is utilized to design the group behavior route based on collision detection and avoidance, and the acquired path data is then imported into Maya. Maya's tools will be utilized to create the 3D environments, animations, and character designs. Group animation effects are achieved by combining many routes [21]. In article [22], APTOensures the production of huge rangegrouping animation in real time, the grouping animation characterization architecture and the space separation perception algorithm are both examined and developed. As a consequence, the article reduces the need for model coordination in an animation system without compromising real-time performance or animation quality. Since it reduces the computational burden of creating large-scale group animations while still meeting their real-time requirements, it is very relevant and valuable.In the article [23], a technique for the automated production of surface-stitched images for use in multimedia animation is proposed. The fundamentals of surface stitching are examined first. This is used to compare the obtained image’s feature vectors to their base-level counterparts. Research [24] is focused on the investigation into interactive innovation in the field of television animation and cinema via the use of a visual sensor Maya-Unity animation simulation. The article begins with a brief introduction to the state of the use of effective imitation knowledge in the film and television animation industries. The document may be seen from a graphical viewpoint in the scene view, or its textual information can be viewed in the code view. The Dreamer has a split window that displays both perspectives, but only one at a time, thus it’s important to designate a button for switching between scenes and languages. As time passes and the plot develops, so too will the animated scene. Lighting design should thus include the animation of light strength and color high-temperature variations.Research [25] focused on the use of 3D modeling software for fashion creation in a 5G simulated reality setting on a computer. The article examined the features of VR technology in the context of the 5G age of computing, and it suggests a VR-based modeling technique for 3D apparel creation. The study expands upon the current state-of-the-art domestic and international research on 3D clothing design by investigating how character virtual modeling (VM),garment VM, and accessory VM may be brought to fruition. The shortcomings of current 3D clothing design are used to inform the creation of a more refined, practical approach to designing clothes in three dimensions.

Table 1: Related work

Reference	Objective	Result
[13]	The study offered a framework for creating panoramic views of exposition halls as well as a plan for incorporating the knowledge gained from creating virtual reality displays into the arrangement of these areas.	Based on the comparison, the study demonstrates that the approach takes significantly less time than the feature point-based algorithm.
[14]	The researchcombines the languages of conventional Chinese painting with digital image production to create a more creative reproduction. This will be achieved through the optimization of a shared evolutionary algorithm and exploratory simulation.	The study explores the applications of digital illustration and promotes the growth of graphic design as a creative medium in China.
[15]	The research was to increase the collision detecting algorithm's detection performance by combining the Snake model with a multiline swarm particle algorithm. It analyses the efficacy of conventional algorithms in detection and validates their detection performance.	The experimental findings presented in the study demonstrate that the K-DOPs method has a frame rate of 6.7.
[16]	A genetic evolution search approach is used to suggest an optimization search method. They go on to examine the ecologically aesthetic aspects of root-cutting art, continuing with its artistic character.	The technique creates a surface that is visually consistent with the original by identifying similar locations on the sample surface and reproducing them in the finished image.
[17]	Utilizing 3D visual communication technology and identifying and extracting the frame characteristics of the video picture under grey projection, an animation design is created.	The results of the experiment show how well the recommended approach works to speed up the accurate reconstruction of video images and improve the visual presentation of animation clips.
[18]	The study provides the TCILP("Tower Crane Intelligent Lifting Path Planner") as a tool for negotiating challenging lifting environments. A recently constructed warehouse or a dilapidated factory that has stood empty for decades could serve as the scene.	The study builds a "virtual" version of a real place, such as a factory or construction site, using cutting-edge laser scanning technology.
[19]	The study shows how image stitching technology can be utilized to streamline the process of creating animation textures for 3D models using the technique of creating a "Tai Chi" animation. A handheld camera was utilized to capture pictures in an area where there would be some overlap.	The proposed image splicing method increases efficiency and produces better-quality panoramic photos, according to Matlab experiments conducted with actual data.
[20]	The study looked into the fundamentals of three-dimensional modeling in the context of virtual and augmented reality. They also developed a three-dimensional texture calculation method that can be	The study increases the realism of various patterns and styles on object surfaces.

	used in texture analysis to increase the realism of surface patterns and styles.	
[21]	The route for group behavior based on avoiding collisions and detection is designed using the enhanced artificial fish swarm method, and the obtained path data is subsequently imported into Maya.	The 3D circumstances, character designs, and animations will be produced using Maya's tools. Several pathways are combined to create group animation effects.
[22]	The work ensures that complex cooperative animation are produced in real time, and it analyzes and designs the space isolation awareness approach as well as the personality model for group animation.	It was extremely pertinent and helpful since it lessens the computing load of producing large-scale group animations while still fulfilling their real-time needs.
[23]	An automated method for creating surface-stitched images for multimedia animation. They start by going over the basics of surface stitching.	The study compares the feature vectors of the produced image with those of the base-level model.
[24]	The research focuses on using a visual sensor in Maya-Unity animation simulation to investigate interactive innovation in the realm of film and television animation.	Designating a button for alternating between scenes and languages is crucial. The Dreamer features a split window that shows both perspectives, but only one at a time.
[25]	The research concentrated on using 3D modeling software to create apparel on a computer in a 5G virtual reality environment. The paper proposes a VR-based modeling method for 3D clothing design and looks at the characteristics of VR technology in the framework of the 5G computing era.	They build a more sophisticated, useful method of designing clothes in 3 dimensions by taking into account the limitations of existing 3D clothing design.
[26]	The process of reconstructing multiframe animation and animated video images based on visual communication involves the extraction of complex characteristics through deep learning.	The recommended method can significantly improve how animation video images are visually propagated, according to experimental results, and it can quickly reconstruct video images with high precision.
[27]	The study suggests a large-scale, 3D virtual simulation-based museum building tourism demonstration system. The notion of virtual reality (VR) was presented first, followed by its features and system classification.	The research state of VR technology both domestically and internationally, as well as the use of 3D virtual simulation, was also covered.
[28]	The paper first provided an overview of the creation of a VR training program and preliminary pilot research. The efficacy of a 360° panorama VR training application as well as a 3D designed one was then compared through a quantitative and qualitative evaluation.	According to test results, the 360° panoramic group had an average normalized gain of 0.43 and the 3D modeled VE group, 0.03.
[29]	The paper primarily described the implementation	A more natural method of obtaining

	of Internet of Things-based virtual reality oil painting, which allows users to accomplish a variety of remote monitoring and control tasks while submerged in a virtual reality setting.	physical information and engaging in virtual interaction is offered to users by humanized three-dimensional HCI interfaces, which also increase user immersion and involvement.

3. Methods

3.1 Genetic algorithm

Probabilities for the individual base classifiers are set in stone after they've been determined, and flexibility between individual base classifiers is ignored, in the standard AdaBoost approach. This research makes use of GA for the adaptive integration of basic classifiers. In Adaboost, the starting population of GA is the number of weak classifiers, and the number of decision groups is the weight of each weak classifier. The number of times iteration may be repeated is limited by the constant T, which in 0 is infinite. The optimization impact of the method is very sensitive to its crossover and mutation probabilities. The literature suggests the following definitions of crossover probability and mutation probability for use in parameter equations (1-3):The methodology section explores the finer points of the implementation of the GA, illuminating the careful selection of its parameters and offering a thorough explanation for these decisions. The system restricts flexibility between these classifiers because, in the context of the traditional AdaBoost technique, probabilities for particular base classifiers are firmly specified once calculated. On the other hand, this study is the first to employ a GA to integrate basic classifiers adaptively. Interestingly, the number of weak classifiers matches the initial population of the GA, and the number of decision groups is determined by the weight of every weak classifier.

$$T_f = \gamma \qquad (1)$$

$$T_n = 0.1(1-\gamma) \qquad (2)$$

whereγ is a control variable.

To specify the fitness value, we can suggest:

$$fit = \frac{\sum_{x=1}^{M} X(j(I_x)=j_x}{M} \qquad (3)$$

A typical GA is seen in Figure 1 below.

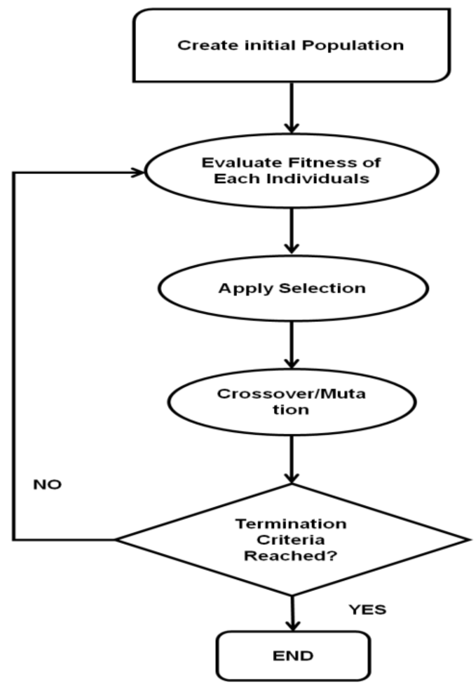

Figure 1: Typical GA flow chart

The encoding and evaluation functions are two of the genetic algorithms' common problem-dependent components. To begin translating the issue into computer language, the researcher began with problem encoding. The best way to describe the issue at hand is generally determined by its specifics. Different types of representations include:

- Binary encoding: Each chromosome is represented by a string of ones and zeroes in binary encoding. The knapsack problem is a great example of when binary encoding might be useful.
- Permutation encoding: Permutation encoding uses a string of integers to denote a chromosome's location in a sequence. The Traveling Salesman issue (TSP) is a good example of an ordering issue that may benefit from this technique.

- Value encoding: Chromosomes may be encoded as a series of values like numeric digits, letters, or even physical things. These values may be letters, digits, etc.
- Tree encoding: The encoding method known as "tree encoding" visualizes each chromosome as a tree containing instructions or programs. Genetic programming, which uses evolving programs, benefits from tree encoding. The following outline provides a concise summary of GA operation after chromosomal encoding.
    i. Start: The first phase of every GA is to generate an initial population of random individuals. After that, we use a string sequence of length L that matches the problem encoding to represent each created person as a chromosome. A "genotype" population is then generated at random as the last phase.
    ii. Fitness: The next step is to calculate an individual's fitness level (x) within the current population. Individuals are paired based on their fitness worth and the values that are prioritized in the assessment process. Although assessment and fitness are sometimes used interchangeably, there is a significant difference between the two when it comes to GA. Performance is rated according to predetermined criteria using an evaluation function or objective function. A spectrum of reproductive options is derived from the fitness function's performance metric.
    iii. Selection (Reproduction): The process of selection determines which chromosomes are used in mating and reproduction and how many children each chromosome generates. Because "the better an individual, the higher its chance of being a parent," this is the primary goal of the selection process. Depending on the nature of the situation at hand, practitioners may use either tried-and-true or user-defined selection procedures.
- Crossover: The parents of the hybrid child are decided via the selection procedure. To accomplish crossover, a location on the chromosome at which genetic material is exchanged between parents is chosen at random. The child of a crossover is the result of a specific point of interchange between different sections of two parents.
- Mutation: Mutation often occurs after crossover has been performed. This operator randomly modifies one or more "genes" to generate new "offspring," producing adaptive solutions that are less likely to converge to a local optimum. In binary encoding, for instance, it is possible to randomly flip one or more bits from 0 to 1 or from 1 to 0.
- Termination (stopping) criteria: There are several ways to conclude GA before announcing the best possible solution, some of which are:
    i. There has been a maximum generation count achieved.
    ii. The population-level variation in fitness as a whole is less than a fixed threshold.
    iii. The highest possible fitness index has not increased.

Animating VR scenes through the flawless alignment of several frames presents a number of complex optimization challenges that are addressed by the use of GAs. Through iterative refinement of stitching setups and parameter optimization for improved coherence, GAs make use of concepts from natural selection and evolution. GAs provide an empirical basis for their effectiveness in VR, where time and space alignment is crucial. They adjust solutions across generations to create the best possible scene continuity. The sophisticated search features of GAs efficiently alleviate difficulties such as discontinuities and frame misalignment, giving them a strong solution for enhancing the overall quality and efficiency of animation VR scene stitching modeling.

3.2 Animation scene splicing

An emotion module, a behavior module, a perception module, and a 3D animation(3DA) generating module make up the bulk of the 3DAscene splicing system's major components. The big picture of 3DAmay be seen in Figure 2.

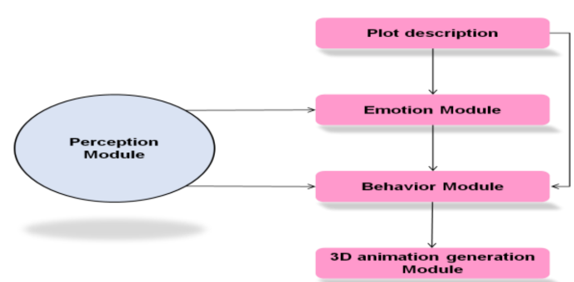

Figure 2: System architecture for 3DA

The sensing module is responsible for providing the emotion and action modules with data that has been simulated about virtual characters by analyzing various virtual situations, converting information about objects in the scene and the characters' surroundings into sensing data, and so on. Included in the story's description, the emotion module also determines how each character's emotions will be transformed, how often those emotions will be refreshed, and how realistic the characters' appearances will seem in 3DA. The behavior module of a 3D cartoon character is responsible for the character's response time and acting skills, and its quality depends on how well it was programmed. The storyline description also contains the character's conduct, which includes their unique activities. When combined with sensory data, it generates a library of motions and a sequence of actions that may be controlled in real-time. The heart of every 3DAsystem is the 3DAgeneration module, which is where all the magic happens. Character modeling allows for the display of not just the virtual character's look, but also the character's actual physical condition, including their actual height and weight.

The goal of scene modeling is database management and operation. To create a convincing 3D environment, the scene database may relay all the information about the actual world that can be applied to the digital one. The most sophisticated approach for manipulating the actions of virtual characters, motion control sets the wheels in motion for animated figures. With the character motion library as a foundation, the tedious motion simulation of virtual characters may be finished simply by expressing the behavior characteristics, rather than requiring sophisticated partial detail modification.

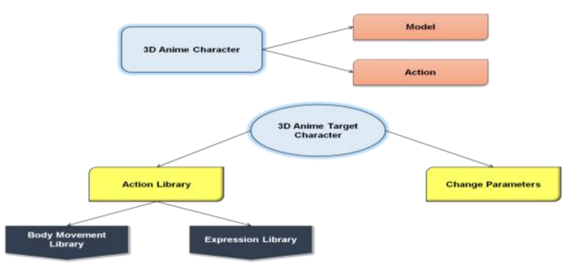

Figure 3: The Animation's flowchart

Figure 3 depicts the 3DAtarget quality that can be obtained by simply selecting the character prototype the user needs and modifying its parameters, such as its elevation and body quantity, to produce the desired result.

All of the original movements of the 3DAqualitymodelare preserved in the 3DAtarget typeset action library. The term "3DAcharacter action library" refers to a collection of standard routines developed for use with a pre-production character model. Users are given complete creative control over the look and feel of 3D animated characters using a graphical user interface, allowing them to design their custom characters or create whole new ones. Obtaining many motion samples of characters and storing them in a motion library using motion capture technology. Through the use of virtual artificial synthesis software, the resulting motion samples are exhibited in three-dimensional form, allowing the 3DAsystem to actualize visualization and aid in the modification of character model movement. The new action is validated as being rational. The 3DAsoftware modifies the initial pose *position* (y_i) to get a new pose *position* (y_i) based on the character's activity *motion*(y). All of these steps are necessary to bring the illustration's interactive exploit intent to life. The user interface window is H ×N in size.

Use the mouse to move the role model. When traveling, the direction h changes to Δm, and the direction k changes to Δn. The "Euler theorem" states that the Euler angle <α, β,γ> indicates the rotation in those respective directions, *m*, *n*. Following some contemplation, the connection inequation (4):

$$\sin\alpha = x\Delta \mathrm{m} \backslash \mathrm{F}(1-\mathrm{z})\Delta \mathrm{n} \backslash \mathrm{H}$$
$$\sin\beta = y\Delta m \backslash F(1-x)\Delta n \backslash H \qquad (4)$$
$$\sin\gamma = z\Delta m \backslash F(1-\gamma)\Delta n \backslash H$$

Where$x$, y,*and* z are the authority factors respectively, indicating the manipulate degree of Δm and Δn on Euler approach$<\alpha,\beta,\gamma>$in the 3 directionof l,m,n. By computationally determining the model's new position, it is possible to simulate the model's use in a three-dimensional animation simulation. Computer graphics are used in animation scene modeling technology to create an abstracted 3-dimensional geometric model of a virtual landscape's topography and buildings using polygons. Simultaneously, it must construct the virtual scene's lighting and material model.

4 Results and analysis

The simulation environment consists of 760 m RAM and a Pentium m1.60 GHz Processor. The primary CPU is a dual-core Intel second-generation core named OptiPlex 3010, and the computer is running Windows 10 flagship 32 bits. The simulation application is called MATLAB 2020 B.

4.1 Scene splicing system animation analysis

After the VR scene and 3D animated figure have been built, texture maps and control settings may be applied to the model to make it seem more realistic. The technique of texture mapping allows for the simulation of complex and irregular color textures on figures (things). By using the texture mapping technique to any VR scene on a 3DA model, we may perhaps get better color texture, higher quality 3DA, and a faster modeling time. There are two stages to texture mapping technology:

1) The attributes of the texture dictate the features of the persons surface that need to be described in that form.

2) Realistic effects may be compromised by using just simple contour facial appearance and skimping on surface texture details. Since the person or thing has a curvature to at least a portion of its surface, its overall curvature direction must be determined. The calculation method is as follows:

Let's pretend that c_1, c_2, *and* c_3 are the three corners of a triangle patch, with $[c_1 - c_2]* [c_2 - c_3]$ perpendicular to the patch. Once normalized, use equation (5)to obtain the triangular patch's normal vector V, the sum and average of all the normal vectors.

$$O = \sin\alpha \sum_{i-l} c\, i = \pi r^2 - \frac{F(1-a)\Delta g}{G} \quad (5)$$

Using the perspective projection transformation, the texture coordinates of the grid points may be determined; in addition to the mapping relationship that exists among the surface patch as well as the matching texture coordinate. According to the equations (6) and (7),

$$l[v\ u\ 1]^S = lW' = GW \quad (6)$$

$$G = \begin{bmatrix} g_1 & 0 & 0 & g_4 \\ 0 & g_2 & 0 & g_5 \\ 0 & 0 & g_3 & 0 \end{bmatrix} \quad (7)$$

The unknowns are denoted as g_1, g_2, g_3, g_4, g_5; The homogeneous texture coordinate for texture coordinates u, v is W ′; W; Coordinate W is a regular grid with no gaps; G is the constant coefficient of the perception edge matrix of 3× 4, and k is the projection matrix itself.

Equations (6) and (7) reveal that there are two distinct linear equations for each set of matching mesh vertices and texture vertices. Three feature point groups must be chosen to convert matrix G. Equation (7) may be made simpler by setting the texture image size to m × n and then combining the texture image size that was obtained.

4.2 Experimental analysis and results

Decompose the scene using a WTto get the low frequency coefficient $N(m,n)$ and then convolve $N\,(m,n)$ with GA to get equation (8):

$$N_j(m,n) = r_1 \otimes N(m,n)$$

$$m_i(m,n) = r_2 \otimes N(m,n) \quad (8)$$

Then compare the corresponding $N_j(m,n)$, and $m_i(m,n)$, (when j = i), and As stated in Equation (9), a candidate coefficient is chosen by picking the one with the biggest value of each of the two variables.

$$(m,n) = \begin{cases} N_j(m,), N_j(m,n) \geq M_i(m,n) \\ M_j(m,n), N_i(m,n) < M_j(m,n) \end{cases} \quad (9)$$

As stated in equation 10, the final splicing coefficient is calculated using the scene entropy function and evaluation function.

$$G_\omega(m,n) = -\sum_m \sum_n L_m(m,n) ln[L_m(m,n)] (10)$$

Take the greatest high-frequency coefficient out of the $G_\omega(m,n)$ values that correspond to the two photos that will be combined to represent the spliced scene. The machine used for this experiment has a Windows 7 operating system, an Intel Core i3 processor with a primary clock of 2.26GHz, and 4GB of memory. Simulated experiments are programmed using Matlab r2010b. An experiment was carried out utilizing a scene with a changed focus to see whether the strength of the adapted method provided in this editorial could be established. As illustrated in Figures 4 and 5, the three conventional **WT**techniques and the enhanced methodology suggested in this article are used to compare, simulate, and assess the scenes to be spliced as shown in Table 1.

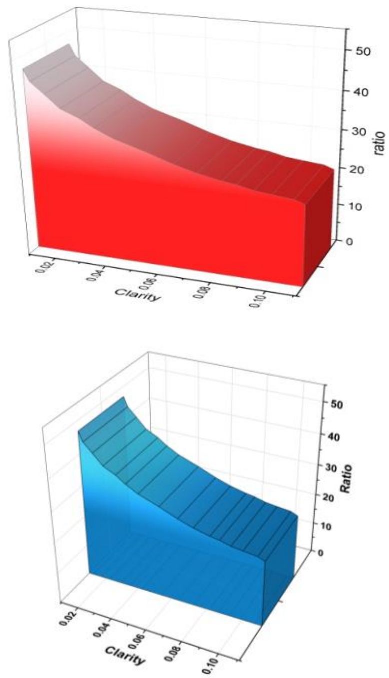

Figure 4: Comparison of traditional algorithm

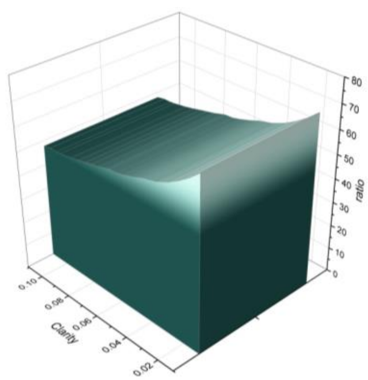

Figure 5: Outcomes of GA

Table 1: Traditional algorithm values

	ratio
Linear Scale	Linear Scale
0.009352	46.87563
0.011621	43.90256
0.016764	41.14571
0.022549	37.92939
0.029621	36.06446
0.035066	34.01034
0.042138	31.92919
0.053747	29.63182
0.064033	27.33445
0.072692	25.7398
0.081692	24.5776
0.086835	24.11813
0.092961	23.19918
0.09939	22.7397
0.107104	22.28023
0.110961	21.36128

The high-frequency and low-frequency coefficients in Algorithm 1 are calculated using weighted average rules, while in Algorithms 2 and 3, the high-frequency and low-frequency coefficients are calculated using absolute maximum rules. The VR stitching impact of the revised algorithm shown here is superior to that of competing methods after extensive testing and evaluation. The conventional algorithm's VR stitching scene has a virtual shadow, while this one has better brightness, contrast, and overall detail. The dial's numbers and the box's lettering stand out more clearly than other approaches. Following a subjective assessment of the splicing scenes produced from various approaches, this study offers some widely used objective evaluation indices for comparing and analyzing the splicing results:

- The average gradient may indicate the scene's clarity as well as the texture's variation features and the contrast of the scene's finer details. The scene is more distinct the higher its worth.
- The scene's contrast is reflected in the standard deviation. The higher the disparity, the more distinct the resulting stitched scene.
- The sharpness of a picture is determined by how well its edges and features stand out. In general, a higher sharpness rating indicates that a larger percentage of the original scene's information has been preserved in the resulting splice.

In an experiment, the fluidity of the group link between the animated typeset in this system was verified using footage of a basketball player. There are 60 frames in all, and each section lasts for 10 of them. The two parts of this system join with a pretty smooth connection effect in this study. May not only join the two segments' motions but also save the information from the first segment's motion and use it. When playing 3DA, if the transitions between motion clips aren't seamless, a flashing effect occurs, and the characters' movements don't seem very genuine. Experimental results demonstrate the system's ability to realistically animate 3D character motion by seamlessly integrating motion segments.

Exhaustive enumeration reflectance (EER), Cross-correlation (CC), Geometric (GEO), and global optimization of differences based on genetic algorithm (GOD) VR stitching techniques were used to stitch all test cases. In the following examples, we see grey for preexisting algorithms and blue for novel varieties of rising sun algorithms.

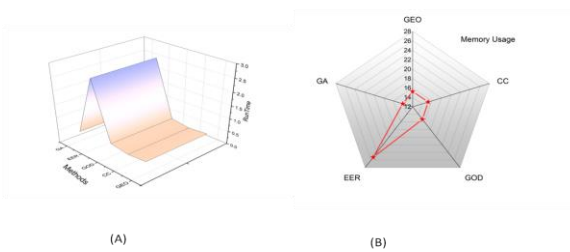

Figure 6: Charts of the quantitative criteria for test case: run time (A), memory usage (B)

Table 2: Memory usage comparison values

Methods	Memory Usage
GEO	15.25
CC	15.25
GOD	15.31
EER	25.27
GA	14.05

Table 3: Run time comparison values

Methods	Runtime
GEO	0.47
CC	0.41
GOD	0.51
EER	2.64
GA	0.38

Four different stitching methods are compared in Figure 6, Table 2, and 3 using the four quantitative criteria. The GODalgorithm takes longer to run, while the EER algorithm takes much longer. Similar results may be achieved with alternative VR stitching techniques. The memory requirements for GEO, CC, and GOD are about the same, but those for EER are lower to greater. The GOD method underperforms the CC, and EER algorithms in terms of mean repositioning error and VR stitching error estimator.

One often used metric to assess the performance of deep learning models in classification problems is accuracy. By contrasting the observed labels with the expected ones in the input data, it calculates the proportion of accurate forecasts a model produces. By evaluating how well a forecast matches the real label, its accuracy is ascertained.Figure 7 shows the comparison of accuracy among conventional methods with GA. Our proposed method has an accuracy value 98.2 %.

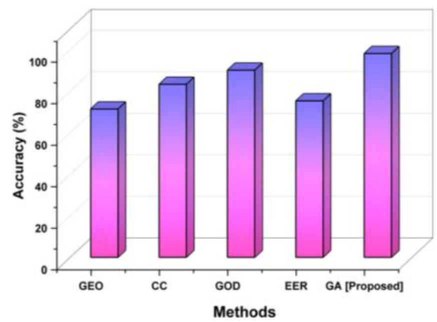

Figure 7: Graphical outcome of accuracy

Precision is one of the key indicators of achievement in classification roles. The ratio of accurate projections to all correct assertions generated by the model yields the proportion of correct positive forecasts, also known as true optimistic predictions. The entire quantity of reliable estimations subtracted from the total computation yields the accuracy calculation. Figure 8 shows the comparison of precision among conventional methods with GA. Our proposed method has an accuracy value 97.5 %.

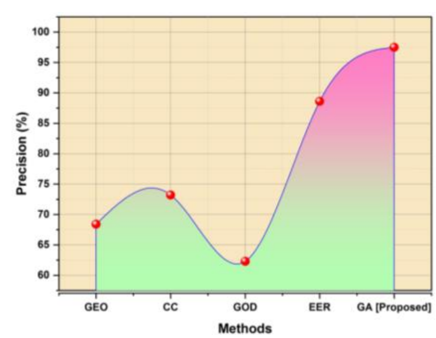

Figure 8: Graphical outcome of precision

4.3 Discussion

A sophisticated and comprehensive method is presented by the incorporation of a genetic algorithm into the animation VR scene stitching modeling, in conjunction with EER, CC, GEO, and GOD based on Genetic Algorithm. Comprehensive List Reflection makes it possible to carefully investigate various stitching setups, guaranteeing a thorough study. By finding correlations and patterns among scene segments, cross-correlation helps to improve the accuracy of frame alignment. Maintaining spatial links through geometric considerations allows for a smooth transition between frames, making VR more immersive. A layer of intelligent optimization is added with the inclusion of global optimization of variations using genetic algorithms, which minimizes discrepancies and refines solutions iteratively. This combination of methods not only tackles the difficulties associated with VR scene stitching but also demonstrates the mutually beneficial relationship among multiple parameters and algorithms, which improves the effectiveness and caliber of the modeling procedure as a whole.

5 Conclusions

These researchers evaluated an enhanced technique for integratingWT animation scenes. The high-frequency coefficients are computed using GA, and the most beneficial result is chosen after being compared to the traditional model. To enhance the quality of spliced scenes, this method employs an inverse WT to process the low-frequency coefficient using a splice procedure based on the mixture of the irregularity assessment function as well as the 8 neighborhood local difference. In GA runtime achieves 0.38 & memory usage is 14.05. This paper's proposed approach is an improvement over the conventional algorithm in terms of both objective and subjective assessment, and it has produced a strong combination effect. Rich edge dataas well as great scene quality in the VR stitching scene attest to the efficacy of the GA.Real-world applications of GA include supply chain management optimization, routing and scheduling efficiency improvements, and logistics optimization. They are used in drug development to refine molecular structures to increase medicinal efficacy and in financial modeling for portfolio optimization.GAs may have trouble processing complex and large-scale virtual scenes in Animation VR scene stitching models, which could make it harder to achieve smooth transitions.

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