Game Artificial Intelligence Communication Positioning on Mobile Devices

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บทคัดย่อ—ระบบระบุตำแหน่งบนโลกได้กลายเป็นเรื่องธรรมดาในโลกการนำทางในโลก การแพร่หลายของอุปกรณ์เคลื่อนที่กำลังเปิดประตูสู่การเล่นเกมแบบจีพีเอสระบุตำแหน่ง คนในยุคปัจจุบันจะไม่รู้จักกับคำว่าโลกที่สูญหายไป ซึ่งเป็นสิ่งที่ไม่สามารถเปลี่ยนแก้ไขได้ โดยการคำนวณหาตำแหน่งที่อยู่ระหว่างดาวเทียมที่โคจรรอบโลก ขณะที่สิ่งนี้ได้กำลังเกิดขึ้นใหม่ จึงขอนำเสนอให้เข้าใจถึงฟิสิกส์ที่อยู่เบื้องหลังของระบบระบุตำแหน่งบนโลก และแอปพลิเคชันปัจจุบันในโลกของการเล่นเกม ให้เรานึกถึงตำแหน่งที่อยู่ใกล้พื้นผิวโลกโดยทั่วไปในระบบพิกัดทางภูมิศาสตร์ เกมตำแหน่งที่ตั้งเป็นฐานที่เน้นการเล่นเกมที่ผู้เล่นกำหนดการเล่นขึ้น ผู้เล่นมีภารกิจกับผู้เล่นคนอื่นที่เล่นร่วมกัน เกมจะส่งผลที่จะกระตุ้นให้กับผู้เล่นได้สร้างภารกิจตามตำแหน่งสถานที่ตั้งแต่ตอนแรกที่เล่น เกมตำแหน่งที่ตั้งเป็นฐานต้องใช้ตัวละครในลักษณะที่มีการประสานกันกับจุดพิกัด วัตถุประสงค์ของการวิจัย คือ การพัฒนาอัลกอริทึมของเกมตามตำแหน่งบนอุปกรณ์เคลื่อนที่โดยใช้ระบบระบุตำแหน่งบนโลก การใช้อัลกอริทึมคือการเคลื่อนที่หรือการค้นหาเส้นทางนี้มักจะใช้เวลามากที่สุดในกระบวนการของปัญญาประดิษฐ์ การเชื่อมต่อแพร่กระจายสัญญาณในการแก้ปัญหาด้วยการส่งข้อมูลทุกอย่างและปล่อยให้ทำงานตามกระบวนการออกที่ต้องการในเกม หลักการแก้ปัญหาในการทำงานจะใช้เอเจนต์ส่งสถานการณ์และเหตุการณ์ที่เกิดขึ้น

คำสำคัญ: ปัญญาประดิษฐ์, อุปกรณ์เคลื่อนที่ ,ระบบระบุตำแหน่งบนโลก

Abstractó The global positioning system has become commonplace in the navigational world, the proliferation of mobile devices is just now opening the doors to gaming global positioning system. The current generation will never have known a world where getting lost was something that could not be fixed by trilaterating their position between satellites orbiting the planet. While this genre is just emerging, weíd like to give you an introduction to the physics behind Global Positioning System and the current applications in the gaming world. Let us recall that positions near the earthís surface are generally given in the geographic coordinate system. The location-based game that focus on user-generated game play. Players can missions which other players carry out. The games intend to animate the players to generate location-based missions in the first place. The location-based game increasingly requires characters to move in a coordinated manner. The studyís purpose was to develop the location-based game algorithm on mobile devices using. The common use of algorithms is for movement or path-finding. This is usually the most time-consuming Artificial Intelligence process. Broadcasting solves the problem by sending them everything and letting them work out what they need in game. Approaches solve the problem of working out which agents to send which events.

Keywords- Artificial Intelligence; Mobile Devices; Global Positioning System

I. INTRODUCTION

Mobile Devices have brought into our lives the willingness and the possibility to be always reachable by anybody. Gaming has always been one of peopleís favorite digital applications. They have almost become an extension of ourselves. Service providers are riding this wave by continuously offering new appealing services. Among the others, mobile games represent a great and ever-increasing source of revenue in the mobile service market. Indeed, market studies report incomes for the wireless gaming industry. The trend toward a massive use of mobile games is out of dispute, several technical

problems remain unsolved; the market success of future mobile device games also passes through providing valid answers to them. The game has to be endowed with an Artificial Intelligence that is fun to play against: neither too trivial, nor too tough.

Artificial Intelligence solution represents our main scientific contribution, while creating our mobile device of the location-based game, we have not overlooked at two practical problems that are crucial in the successful deployment of a real mobile device game is connectivity among playersí mobile phones and compatibility with the highest number of mobile phones in the market. We have evaluated possible alternatives and finally adopted the state-of-the-art technology that allows the widest connectivity and compatibility among existing mobile device. The incredible proliferation of mobile phones, which have surpassed in number base line phones in the world. The increasing availability of wireless connectivity provides the possibility to play online with other people and allows to create new business models where the game is bought online and directly downloaded in the mobile phone. The technological advances have transformed mobile phones from a cordless version of a regular phone into a hand-held computer able to deliver quality audio/video and quickly run complex algorithms, as those required by recent games. Depending on the information, different tactics will be adopted. Therefore, in order to win, a player has also to infer the type of each of the opponentís pieces. This information can be extracted from the playerís behavior, also keeping in mind that different players can adopt different strategies, for instance, by less frequently to bluffing or resorting more. The game is particularly interesting for players do not have a complete knowledge of the game state. They can both see the position of game pieces on the game world, but they cannot see the type of the opponentís ones.

II. PURPOSES OF THE STUDY

The studyís purpose was to develop the game artificial intelligence communication positioning on mobile devices.

III. SCOPE OF THE STUDY

The scope of the research was a development of research experiment which develops to the game artificial intelligence communication positioning and design algorithm on mobile devices using global positioning system, get position via the kind of information that global positioning system provides is the movement, waypoint and path-finding for time-consuming artificial intelligence process.

IV. LITERATURE REVIEW

The pedagogic group of games involves participatory simulators, situated language learning and educational action game. Finally the hybrid game is mostly museum location-based games and mobile fiction, or city fiction. Games played on a mobile device using localization technology like Global Positioning System are called location-based game or Location-based mobile game. For very small distances, this approximation is probably accurate enough. However, because the earth is actually a sphere, over great distances the calculated route will be much shorter than the actual distance along the surface. The shortest distance between two points on a sphere, especially in problems of navigation, is called a great circle. A great circle is the intersection of a sphere and a plane defined by the center point of the sphere, the origin, and the destination. The resulting course actually has a heading that constantly changes. On ships, this is avoided in favor of using a rhumb line, which is the shortest path of constant heading. This makes navigation easier at the expense of time.

A. Distance

We convert the angles to radians before using them in the trig function. Next we will begin showing you an implementation of several different formulas in Programming. These all use the following data structure to hold latitude and longitude information. The one we will discuss here is the haversine formula. There are other methods like the spherical law of cosinesand the Vincenty formula, but the haversine is more accurate for small distances than the spherical law of cosines while remaining much simpler than the Vincenty formula.

B. Great-Circle

To find the final bearing, we simply take the initial bearing going from the end point to the start point and then reverse it. However, this requires that your heading be constantly changing with time. The code that calculates the value and returns the compass bearing.

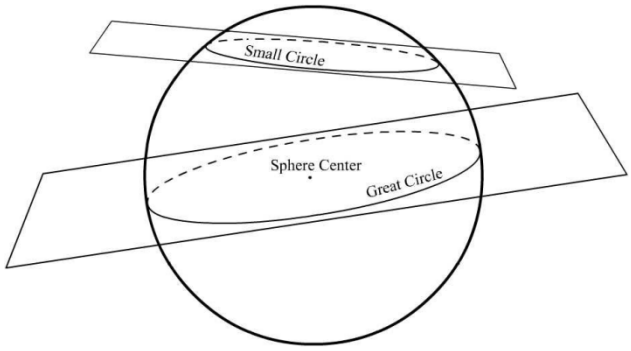

Figure 1. Great-Circle

C. Rhumb Line

The easiest way to begin is to flatten the globe. In a Mercator projection, rhumb lines are straight. In fact, this makes graphically solving the problem very simple. You use a ruler. Mathematically, things get a bitmore complicated.

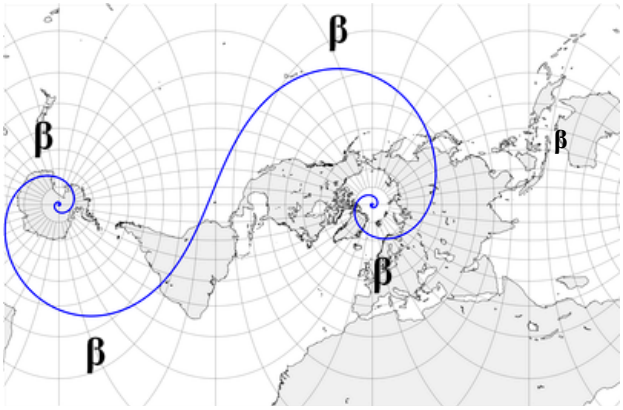

Figure 2. Rhumb Line Spiraling Towards the North and South Pole

To make things easier for us, we are going to abandon the coordinate system of the earth and use the coordinate system defined by our three satellites. The origin will be at satellite 1, the x-axis going directly from satellite 1 straight to satellite 2 and the y-axis being perpendicular to that. The trilateration among three circles gives you an exact position; in three-dimensional space, four spheres are required to determine all three special coordinates. Note that if we included an assumption about being on the surface of some geometric shape, such as the earth, we could reduce the number of unknowns.

V. Structure of AI Location Communication

The current mobile device scenario is dominated by 3G, 4G and 5G. Cellular service providers have done huge investments on this technology. Therefore, this communication means present the advantage of being available almost anywhere. Different communication technologies are available today on most of mobile device, thereby, being able to exploit them has become an important aspect in the success of a location-based game. Unfortunately, Wi-Fi capabilities are currently present only on expensive mobile device while walking in a street, there might not be around any freely accessible Wi-Fi access point thus impeding its use. Wi-Fi is another communication technology that can be free of charge. Its transmission range is in the order but can be used as well to play real-time online with other people all around the world by simply connecting to the Internet through an access point in proximity. Bluetooth was designed to implement personal area networks and, thereby, its bandwidth and latency also allow to support location-based game applications. Bluetooth connectivity is also very popular today as only really cheap mobile device are produced today without it. Transmissions happen only in short range, which implies that players have to be one in front or beside the other to play together. This proximity in the real world is often part of the fun of playing together. The Satellite locations often attend events at Primary anomaly locations. More points are awarded to the prevailing faction at Primary sites than at Satellite sites. Players who participate in an anomaly are awarded a unique badge with the emblem of that anomaly. The connectivity of the game has been ensured through Bluetooth. We are currently adding the possibility to exploit Wi-Fi, 3G, 4G, 5G and Satellite.

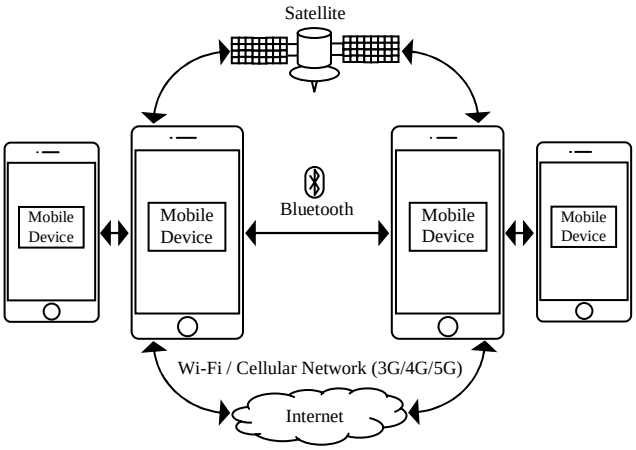

Figure 3. Location-Based Communication

VI. Model of Game Artificial Intelligence

Everything from the decision trees to rule-based systems generates actions. Developers donít work with actions as a distinct concept. The result of each decision making technique is simply a snippet of code that calls some function, tweaks some state variable, or asks a different bit of the game in Artificial Intelligence, physics, rendering to perform some task. Depending on the implementation and the data types of the values stored in the characterís knowledge, different kinds of tests may be possible. A representative set is given in the following table, based on a game engine. For each of these tactics, there are likely to be corresponding tactical locations in the game, either locations that help the tactic or locations that hamper it. Depending on the type of game, there will be several kinds of tactics that characters can follow. Marking all useful locations can produce a large number of waypoints in the level. To get very good quality behavior, this is necessary, but time-consuming for the level designer. Later in the section weíll look at some methods of automatically generating the waypoint data.

Scripts can be treated as data files, and if the scripting language is simple enough, level designers or technical artists can create the behaviors. As production became more complex, there was a need to separate the behavior designs from the engine. Level designers were empowered to design the broad behaviors of characters. Developers moved to use the other techniques. Others continued to program their behaviors in a full programming language, but moved to a scripting language separate from the main game code.

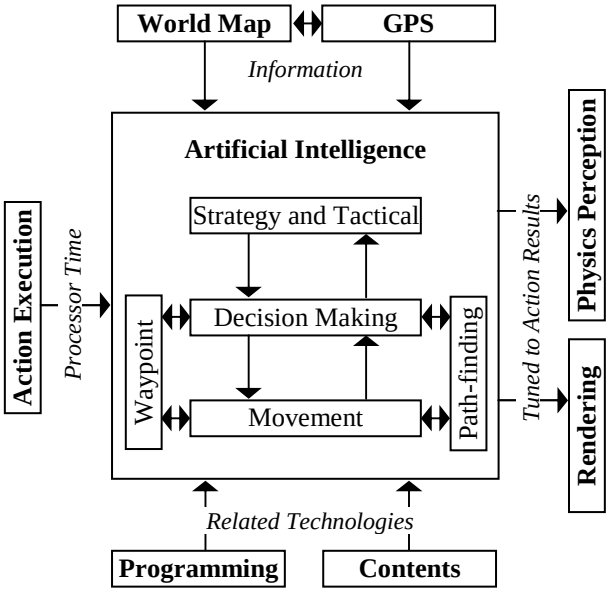

Figure 4. Game Artificial Intelligence Communication Positioning Model

Strong supervision takes the form of a set of correct answers. The learning algorithm learns to choose the correct behavior given the observation inputs. These correct answers are often provided by a human player. A series of observations are each associated with the behavior that should be chosen. The Artificial Intelligence keeps track of the sets of observations and the decisions that the human player makes. It can then learn to act in the same way. The developer may play the game for a while and have the Artificial Intelligence watch.

Weak supervision doesnít require a set of correct answers. Some feedback is given as to how good its action choices are. This can be feedback given by a developer, but more commonly it is provided by an algorithm that monitors the Artificial Intelligenceís performance in the game. If the Artificial Intelligence consistently beats its enemies, then feedback will be positive. If the Artificial Intelligence gets shot, then the performance monitor will provide negative feedback. The problem with interruptible algorithms is that they can take a long time to complete. Imagine a character trying to plan a route across a very large game level. At the rate of a few hundred microseconds per frame, this could take several seconds to complete.

Creatures should not move very far on their own accord. If a creature can wander at random, then it is possible that it will find itself next to a predator before the player arrives. The smaller the hinterland of a creature, the better a level designer can put together a level. The player will not appreciate arriving at a location to find the flock has already been eaten. Typically, however, the creatures simply sleep or stand around when the player isnít near. Limiting the range of creatures at least until they have been affected by the player can also be accomplished by imposing game world boundaries. Large amounts of context information can improve performance, but they dramatically reduce the speed of learning. The context information that is presented is typically fairly narrow. Since the player is responsible for teaching the character, the player wants to see some obvious improvement in a relatively short space of time. This means that learning needs to be as fast as possible without leading to stupid behavior. The context information can be presented to the character in the form of a series of parameter values or in the form of a set of discrete facts.

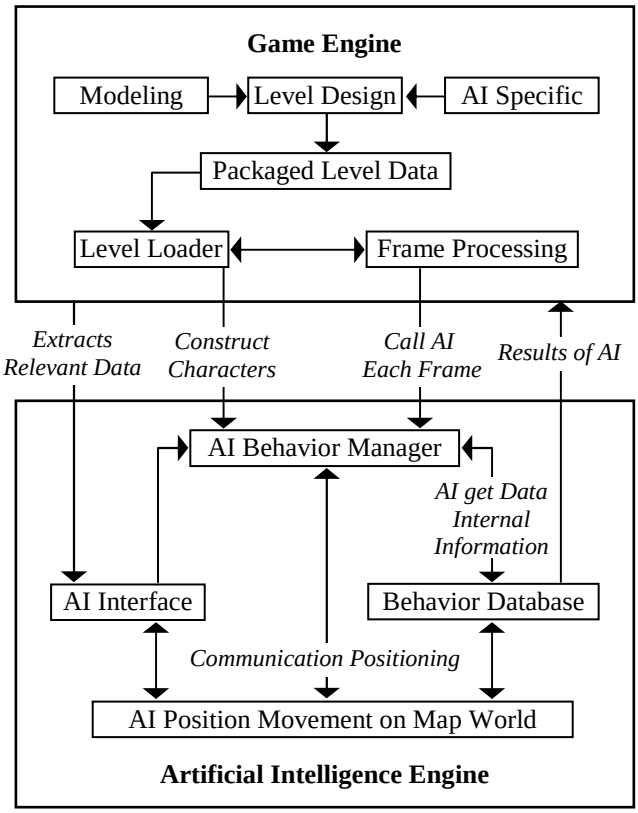

Figure 5. Game Artificial Intelligence Positioning Schematic

VII. LOCATION-BASED COMMUNICATION

The event manager needs to know that the character is interested in the siren. The character is probably not running the exact bit of code that needs to know about the siren, so it stores the event. When the siren is ringing, the event manager sends an event to the character. When it does reach the crucial section, it finds the stored event and responds to it. The events passed to each character can easily be displayed or recorded, making debugging complex decision making much easier. Centralized event passing has significant advantages in code modularity and debugging. Because all conditions are being checked in a central location, it is easy to store a log of the checks made and their results. There is a central checking mechanism, which notifies any number of characters when something interesting occurs. An event-based approach to communication is centralized. The code that does this is called an event manager. The event manager is implemented in chart as follows:

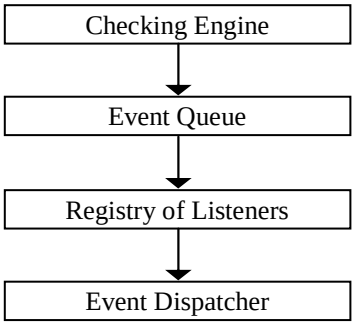

Figure 6. Location-Based Communication Event Elements

The checking engine needs to determine if anything has happened that one of its listeners may be interested in. A checking engine often has to liaise with other services provided by the game. If a character needs to know if it has bumped into a wall, the checking engine may need to use the physicsí engine or collision detector to get a result.

The event queue, once an event is made known to the event manager by being directly passed or through a check, it needs to be held until it can be directly dispatched. The event will be represented as an event data structure. Notifying a character that a siren is sounding can be delayed by a couple of seconds, but notifying a character that it has been shot should be instantaneous. Time-based queuing of events can be very complex, having events with different priorities and delivery deadlines.

The registry of listeners allows the event manager to pass the correct events onto the correct listeners. Characters can register their interest in explosion events. The format used to register interests can be as simple as a single event code. The event managers that have a specialized purpose, the listeners may be interested in any event that the manager is capable of generating. The listener may have a specific interest, and other events may be useless.

The event dispatcher sends notification to the appropriate listeners when an event occurs. The most common way for a listener to be notified of an event is for a function to be called. In object-oriented languages, this is often a method of a class. The function is called, and information about the event can be passed in its arguments.

Approaches solve the problem of working out which agents to send which events. Broadcasting solves the problem by sending them everything and letting them work out what they need. Narrowcasting puts the responsibility on the programmer. Artificial Intelligence needs to be registered with exactly the right set of relevant event managers.

A. Broadcasting

The advantage is flexibility. If a character is receiving and throwing away lots of data, it can suddenly become interested and know that the correct data is available immediately. This is especially important when the Artificial Intelligence for a character is being run by a script, where the original programmers arenít aware what information the script creator might want to use.

B. Narrowcasting

It is a very efficient approach. There are few wasted events, and information is targeted at exactly the right individuals. There doesnít need to be any record of listenerís interests. Each event manager is so specialized that all listeners are likely to be interested in all events. This improves speed again.

C. Compromising

Both broadcasting and narrowcasting depends more on the location-based game, particularly the number of events that are likely to be generated. Often, there arenít enough Artificial Intelligence events to make broadcasting noticeably slow.

VIII. RESULT AND CONCLUSION

Results showing the effectiveness of our profiling methodology are reported. The experimental setting consisted in a mobile device. We studied the reliability of our profiler during a game session. Clearly, at the beginning of a game, the profile cannot be precise as some features of a piece may still be unavailable or underestimated. However, this represents a desirable property as, in general, it is not so important to have a very low error when the location-based game is at the very beginning, whereas it becomes crucial as the game

session proceeds. Thus, even if the models generated by our location-based game artificial intelligence were perfect, the correct classification of a piece may be difficult at the early stage of a game session, given the low informative degree of its profile. We can expect the prediction error to decrease whenever the profile becomes more and more informative and complete. Next set of experiments, we evaluated the performance of the location-based game artificial intelligence. This has been done by estimating the probability to make errors in future games. This measure, very common in the artificial intelligence community for evaluating the expected performance of a classifier, provably gives a statistically unbiased estimate of the expected percentage of mistakes that a classifier will make. The mobile device in our society has transformed them from gadgets into commodities. The technical features of these devices have reached a quality level that makes them able to virtual reality. One of the most successful location-based game is certainly represented by gaming. We discussed technical issues related to this context. In particular, we have proposed an original solution that improves the capability of the artificial intelligence. The algorithm controls how a neuron should generate its state based on its inputs. In networks without specific inputs and outputs, the algorithm generates a state based on the states of connected neurons. In a multi-layer perceptron network, the state is passed as an output to the next layer. We stick with backpropagation and work through the multi-layer perceptron algorithm a completely different learning rule that may be useful in games. To get very good quality behavior, this is necessary, but time-consuming for the level designer. Marking all useful locations can produce a large number of waypoints in the level. Methods of automatically generating the waypoint data, path-finding data, movement data and GPS data.

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