2015/16 Autumn AI Question Liam Dowling T00199360

Question 3

(a) BIOT was used to determine collisions between sprites.

(i) What was BIOT? (1 Mark)

BIOT= Binary Image Overlap Testing

(ii) The following sprite would have been stored in numeric form, derive these numbers. (3 Marks)

(1,66,254,66,1)

(iii)Draw the sprite represented by the following bytes. 129, 195, 126, 36, 36, 126, 195, 129 (3 Marks)

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(iv) If the top left pixel of the sprite in part (ii) was placed at (201,352) and the sprite from part (iii) was placed at (198,348), illustrate on graph paper whether BIOT would detect a collision between them. (3 Marks)

The blue indicates the collision

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(b) Axis Aligned Bounding Boxes (AABB) are not an accurate a means of detecting collisions.

(i) Describe why AABB's are not accurate and outline their use in collision detection within a modern games engine. (5 Marks)

AABBs cannot rotate therefore they are not accurate.

They are used as a detection method to see if two objects MIGHT collide and if theres a chance they do collide then the more detailed collision detection is called upon.

(ii) The following table outlines the positions and ranges of the AABB's for 4 objects, A,B,C. Apply the Sort and sweep algorithm to determine if a collision has occurred. (7 Marks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Zstart | Zend | Xstart | Xend | Ystart | Yend | A |
| 180 | 220 | 300 | 320 | 391 | 411 |  |
| Z | z | x | x | y | y | Active |
| Null | null | null | null | null | null | Collision |
|  |  |  |  |  |  |  |
| Ystart | Yend | Xstart | Xend | Zstart | Zend | B |
| 60 | 80 | 80 | 100 | 210 | 250 |  |
| Y | y,x | x | x | z | z | Active |
| Null | y,x | null | null | null | null | Collision |
|  |  |  |  |  |  |  |
| Zstart | Zend | Xstart | Xend | Ystart | Yend | C |
| 205 | 215 | 319 | 331 | 380 | 400 |  |
| Z | z | x | x | y | y | Active |
| Null | null | null | null | null | null | Collision |
|  |  |  |  |  |  |  |

No Collisions as its only on one axis.

(c) Time must be considered when detecting collisions, illustrate why and outline strategies which could solve time related problems in collision detection. (3 Marks)

Time must be considered for fast moving objects e.g. bullets

Because in between gameloops an object such as a bullet could pass through a wall

This can be solved using a ray cast or by expanding the collision region to cover both instances of the object.