Novel Techniques on Flight Maneuvering Based On Fuzzy Logic Using Human Edge Detection

A.Sampath Dakshina Murthy, P. Tirumala Rao, A.Usha Rani , M.S.G.Prudhvi

Abstract: Maneuvering techniques for flight have been developed using human motion detection and fuzzy logic. The need for predicting various flight paths needs a non linear approach or the situations are extremely complex and difficult to predict. Taking care of uncertainties and various human expressions, an efficient technique has been developed.

Index Terms: Maneuvering, Fuzzy logic, Edge detection , flight mechanism

I. INTRODUCTION
Maneuvering aero planes used in war operations requires skill, experience and intuitive powers of the pilot and effectiveness of the mechanism. In many applications, exact measurements and precise data collection are not feasible. Such situations are complex governed by many non linear relationship as well as uncertainties. To impart artificial intelligence to flight mechanism the most convenient method is to adapt IF-THEN rules of fuzzy inference system by which many real life situations can be brought to a platform where solution can be arrived at despite uncertain situation including inclement weather and different condition of enemy positions during attacks and counter attacks. The objective of this paper is to develop modeling method based on fuzzy logic logarithm to create aerodyne path solutions from the data sets of flight data recorder [1] . The precedence of the algorithm comes from the natural situations which cause human expressions. Paths can be predicted based on study of natural human variations using fuzzy logic. Similar logic applying to neural application.

II. RELATED WORK
Many real situations are similar to the case of maneuvering using fuzzy logic based for predicted paths stored in the FDR. To detect and recognize the human actions so that computer system is able to understand human motions and make further schematic description of the scene to convert as paths the methodology is carried out by taking different physical parameters as inputs for image processing and for fuzzification. In rotation many human impressions need to be observed [2], for generate appropriate time of response. Similarly force angle disgust have to be studied even before they are completed. Fuzzy logic control is a non-linear technique using linguistic approach with membership function and rules [3].

III. OBJECTIVE AND METHODOLOGY
The data from H.60 qualification flight stress syrup is in the process the data through proper code which will be robust to handle varieties in flight and given reliable results. In identifying Air craft usage [4-7]. Basic flight maneuvers involved may vary tactical turns, rolls and other actions to get behind on above an enemy before the opponent can exercise similar techniques. The most important procedure is that of fuzzification or creation of membership function of inputs and outputs to the logical decision making in figure .1. The next step is to create IF-THEN rules for having the knowledge base after processing of the fuzzified data de-fuzzification is required to create chirp data.

The flow chart shown in figure 2 below covers the logical steps required in processing the above. It must be noted that BFM also reduce on the pilots understanding of the geometry of pursuit with the s-dimensional area where different angles of approach can cause different rates of closure. To avoid lower shooting “wrong line overshooting” covers stay of flying out act in front of the opponent is adopt. For crossing enemies flight path, “flight path overshoot” most of the maneuvers offensive such as barrel roll attack, high Yo-Yo, low Yo-Yo and “lag Yo-Yo” . The defender usually maneuvers to force over shoot on the extent the range to drive away and escape. Last is made to make “guns defense” on defense square yard. Image processing techniques of edge detection and edge enhancement used for developing strategic paths on fuzzy logic algorithm in figure 3.

![Figure 1Block diagram of fuzzy logic](image-url)
Novel Techniques on Flight Maneuvering Based On Fuzzy Logic Using Human Edge Detection

Figure 2 Flow chart of algorithm

Figure 3 .Types of Input paths edge detection images

IV. RESULTS AND DISCUSSIONS

The fuzzy logic designer is set by matlab using the steps shown in figure. To start with inputs chosen are time, speed and angles. Mamdani controller based on membership function is selected. The membership function is as shown below. IF-THEN rules have been formulated as displayed. The outputs are there various paths predicted as per requirement represented in figure 4 – 7 the data values are shown in tables 1-3.

Figure 4 Fuzzy Input Controllers

Figure 5 FIS editor for input variables

<table>
<thead>
<tr>
<th>TIME (sec)</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 seconds</td>
<td>10-30</td>
</tr>
<tr>
<td>20 seconds</td>
<td>15-35</td>
</tr>
<tr>
<td>30 seconds</td>
<td>20-40</td>
</tr>
<tr>
<td>40 seconds</td>
<td>25-55</td>
</tr>
<tr>
<td>50 seconds</td>
<td>35-60</td>
</tr>
</tbody>
</table>

Table 1 Input time vs Range variation

<table>
<thead>
<tr>
<th>ANGLE</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>0-150</td>
</tr>
<tr>
<td>Low</td>
<td>50-200</td>
</tr>
<tr>
<td>Medium</td>
<td>100-250</td>
</tr>
<tr>
<td>High</td>
<td>150-300</td>
</tr>
<tr>
<td>Very high</td>
<td>200-360</td>
</tr>
</tbody>
</table>

Table 2 Angle variation vs Range

<table>
<thead>
<tr>
<th>Speed (km per hour)</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>0-800</td>
</tr>
<tr>
<td>S2</td>
<td>765-820</td>
</tr>
<tr>
<td>S3</td>
<td>780-840</td>
</tr>
<tr>
<td>S4</td>
<td>800-860</td>
</tr>
<tr>
<td>S5</td>
<td>820-880</td>
</tr>
</tbody>
</table>

Table 3 Speed vs Range

Figure 6 Fuzzy rules expected path values

If (Time is 10s) and (Angle is Very low) and (Speed is S1) then (Path is P1)  
If (Time is 10s) and (Angle is Very low) and (Speed is S1) then (Path is P2)  
If (Time is 10s) and (Angle is Very low) and (Speed is S2) then (Path is P1)  
If (Time is 10s) and (Angle is Very low) and (Speed is S2) then (Path is P2)  
If (Time is 10s) and (Angle is Low) and (Speed is S1) then (Path is P1)
If (Time is 10s) and (Angle is Low) and (Speed is S2) then (Path is P1) (1)
If (Time is 10s) and (Angle is Low) and (Speed is S1) then (Path is P1) (1)
If (Time is 10s) and (Angle is Low) and (Speed is S2) then (Path is P2) (1)
If (Time is 20s) and (Angle is Low) and (Speed is S1) then (Path is P1) (1)
If (Time is 20s) and (Angle is Low) and (Speed is S2) then (Path is P1) (1)
If (Time is 20s) and (Angle is Low) and (Speed is S2) then (Path is P2) (1)
If (Time is 30s) and (Angle is Medium) and (Speed is S3) then (Path is P2) (1)
If (Time is 30s) and (Angle is Medium) and (Speed is S3) then (Path is P3) (1)
If (Time is 30s) and (Angle is Medium) and (Speed is S3) then (Path is P1) (1)
If (Time is 30s) or (Angle is Medium) or (Speed is S3) then (Path is P2) (1)
If (Time is 40s) and (Angle is High) and (Speed is S3) then (Path is P3) (1)
If (Time is 40s) and (Angle is Very high) and (Speed is S3) then (Path is P3) (1)
If (Time is 40s) and (Angle is Very high) and (Speed is S4) then (Path is P4) (1)

v. CONCLUSION

Fight maneuvering techniques are generated with the help of human motion edge detection sample images collected as inputs to predictable paths. To detect and recognize the human actions so that computer system is able to understand human motions and make further schematic description of the scene to convert as paths is carried out by taking different physical parameters as inputs for image processing and for edge detection techniques. Fuzzy logic have been formed to be adequate equipped to handle various real time membership are faced by BFM in solving the field problems.

REFERENCES


Figure 7 3D view of Angle, Speed and Time