First Blood: Enhancing the Chess AI
by Lina Pulgarin-Duque
1. Alpha-beta & MTD(f)

A quick summary
Alpha-beta
MTD(f)

- Set upper bound to $+\infty$ and lower bound to $-\infty$.
- Set alpha to target minus width.
- Set beta to moving target plus width.
- Call alpha-beta.
- Use the return score to set new upper and lower bounds.
- Repeat until lower bound > upper bound.
- Return that score.
2. First Blood

Method and Results
First-Blood
MTD(f)

- Set upper bound to $+\infty$ and lower bound to $-\infty$
- Set alpha to target minus width
- Set beta to moving target plus width
- Call alpha-beta
- Use the return score to set new upper and lower bounds
- Repeat until lower bound > upper bound
- Return that score

First Blood

- Return whenever our lower bound > target score
- We return something at a greater depth thanks to our database

First Blood
Methods for gathering moves

- Calculate each time
- Transposition Table
- Database using sqlite3
Methods for gathering moves

- Calculate each time
- Transposition Table
- Database

Database

Found results in the database at each depth

Follow that result for 5 plies or until something better comes up
<table>
<thead>
<tr>
<th>Computer’s chess_move:</th>
<th>Computer’s chess_move:</th>
</tr>
</thead>
<tbody>
<tr>
<td>f2f4 time=1.71 sec (avg = 1.71)</td>
<td>d2d4 time=8.69 sec (avg = 3.48)</td>
</tr>
<tr>
<td>Ply number: 0</td>
<td>Ply number: 2</td>
</tr>
</tbody>
</table>

```
8 r n b q k b n r
7 p p p p p p p p
6 . . . . . . .
5 . . . . . . .
4 . . . . . . .
3 . . . . . . .
2 P P P P P P P
1 R N B Q K B N R
```

```
8 r n b q k b n r
7 p p p p p p p p
6 . . . . . . .
5 . . . . . . .
4 . . . . . . .
3 . . . . . . .
2 P P P P P P P
1 R N B Q K B N R
```

<table>
<thead>
<tr>
<th>Computer’s chess_move:</th>
<th>Computer’s chess_move:</th>
</tr>
</thead>
<tbody>
<tr>
<td>c2c4 time=13.8 sec (avg = 13.8)</td>
<td>e2e4 time=65.2 sec (avg = 26.4)</td>
</tr>
<tr>
<td>Ply number: 0</td>
<td>Ply number: 2</td>
</tr>
</tbody>
</table>

```
8 r n b q k b n r
7 p p p p p p p p
6 . . . . . . .
5 . . . . . . .
4 . . . . . . .
3 . . . . . . .
1 R N B Q K B N R
```

```
8 r n b q k b n r
7 p p p p p p p p
6 . . . . . . .
5 . . . . . . .
4 . . . . . . .
3 . . . . . . .
2 P P . P . P P P
1 R N B Q K B N R
```
Results

Performance of Methods

% of Games Won by White

# of Games Played

Alpha-beta
First-Blood
thanks!

Any questions?

You can find me at lpulgarinduque@gmail.com
Dr. Steven Brandt and Patrick Mancuso were both collaborators on this project.

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