**Limit – L, Opposition – O, Discount – D, Random – R**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Single Q-Learning | | | | |
| Combination | Limit | Random | Opposition | Discount |
| None | | | | |
| - | 3 | - | - | - |
| One | | | | |
| L | 2 | - | - | - |
| O | 3 | - | - | - |
| D | 3 | - | - | (0.99, 100) |
| R | 3 | 1 | - | - |
| Two | | | | |
| L + O | 2 | - | Yes | - |
| L + D | 2 | - | - | (0.99, 100) |
| L + R | 2 | 1 | - | - |
| O + D | 3 | - | - | - |
| O + R | 3 | - | - | - |
| D + R | 3 | 1 | - | (0.99, 100) |
| Three | | | | |
| L + O + D | 2 | - | Yes | (0.99, 100) |
| L + O + R | 2 | 1 | Yes | - |
| L + D + R | 2 | 1 | - | (0.99, 100) |
| O + D + R | 3 | - | - | - |
| Four | | | | |
| L + O + D + R | 2 | 1 | Yes | (0.99, 100) |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Double Q-Learning | | | | | |
| Combination | Granularity | Limit | Random | Opposition | Discount |
| None | | | | | |
| - |  |  |  |  |  |
| One | | | | | |
| L |  |  |  |  |  |
| O |  |  |  |  |  |
| D |  |  |  |  |  |
| R |  |  |  |  |  |
| Two | | | | | |
| L + O |  |  |  |  |  |
| L + D |  |  |  |  |  |
| L + R |  |  |  |  |  |
| O + D |  |  |  |  |  |
| O + R |  |  |  |  |  |
| D + R |  |  |  |  |  |
| Three | | | | | |
| L + O + D |  |  |  |  |  |
| L + O + R |  |  |  |  |  |
| L + D + R |  |  |  |  |  |
| O + D + R |  |  |  |  |  |
| Four | | | | | |
| L + O + D + R |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Triple Q-Learning | | | | | |
| Combination | Granularity | Limit | Random | Opposition | Discount |
| None | | | | | |
| - |  |  |  |  |  |
| One | | | | | |
| L |  |  |  |  |  |
| O |  |  |  |  |  |
| D |  |  |  |  |  |
| R |  |  |  |  |  |
| Two | | | | | |
| L + O |  |  |  |  |  |
| L + D |  |  |  |  |  |
| L + R |  |  |  |  |  |
| O + D |  |  |  |  |  |
| O + R |  |  |  |  |  |
| D + R |  |  |  |  |  |
| Three | | | | | |
| L + O + D |  |  |  |  |  |
| L + O + R |  |  |  |  |  |
| L + D + R |  |  |  |  |  |
| O + D + R |  |  |  |  |  |
| Four | | | | | |
| L + O + D + R |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- |
| Quadruple Q-Learning | | | | | |
| Combination | Granularity | Limit | Random | Opposition | Discount |
| None | | | | | |
| - |  |  |  |  |  |
| One | | | | | |
| L |  |  |  |  |  |
| O |  |  |  |  |  |
| D |  |  |  |  |  |
| R |  |  |  |  |  |
| Two | | | | | |
| L + O |  |  |  |  |  |
| L + D |  |  |  |  |  |
| L + R |  |  |  |  |  |
| O + D |  |  |  |  |  |
| O + R |  |  |  |  |  |
| D + R |  |  |  |  |  |
| Three | | | | | |
| L + O + D |  |  |  |  |  |
| L + O + R |  |  |  |  |  |
| L + D + R |  |  |  |  |  |
| O + D + R |  |  |  |  |  |
| Four | | | | | |
| L + O + D + R |  |  |  |  |  |

|  |  |  |  |  |  |
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| Quintuple Q-Learning | | | | | |
| Combination | Granularity | Limit | Random | Opposition | Discount |
| None | | | | | |
| - |  |  |  |  |  |
| One | | | | | |
| L |  |  |  |  |  |
| O |  |  |  |  |  |
| D |  |  |  |  |  |
| R |  |  |  |  |  |
| Two | | | | | |
| L + O |  |  |  |  |  |
| L + D |  |  |  |  |  |
| L + R |  |  |  |  |  |
| O + D |  |  |  |  |  |
| O + R |  |  |  |  |  |
| D + R |  |  |  |  |  |
| Three | | | | | |
| L + O + D |  |  |  |  |  |
| L + O + R |  |  |  |  |  |
| L + D + R |  |  |  |  |  |
| O + D + R |  |  |  |  |  |
| Four | | | | | |
| L + O + D + R |  |  |  |  |  |