**KNN from Scratch Results**

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| **Mozilla with k=1** | **Eclipse with k=1** |
| Accuracy: 0.4017743979721166  F1 score: 0.39981286742214495  Confusion Matrix: [[40 14 18 7 6]  [16 67 37 18 14]  [18 37 89 45 21]  [10 19 49 89 41]  [ 7 8 31 56 32]]  precision recall f1-score support  blocker 0.44 0.47 0.45 85  critical 0.46 0.44 0.45 152  major 0.40 0.42 0.41 210  minor 0.41 0.43 0.42 208  trivial 0.28 0.24 0.26 134  micro avg 0.40 0.40 0.40 789  macro avg 0.40 0.40 0.40 789  weighted avg 0.40 0.40 0.40 789 | Accuracy: 0.39765024853140535  F1 score: 0.3980701555106906  Confusion Matrix: [[ 53 56 81 15 14]  [ 54 129 159 55 35]  [ 92 177 465 100 61]  [ 15 53 116 167 65]  [ 12 34 73 66 66]]  precision recall f1-score support  blocker 0.23 0.24 0.24 219  critical 0.29 0.30 0.29 432  major 0.52 0.52 0.52 895  minor 0.41 0.40 0.41 416  trivial 0.27 0.26 0.27 251  micro avg 0.40 0.40 0.40 2213  macro avg 0.35 0.34 0.35 2213  weighted avg 0.40 0.40 0.40 2213 |
| **Mozilla with k=5** | **Eclipse with k=5** |
| Accuracy: 0.4017743979721166  F1 score: 0.39981286742214495  Confusion Matrix: [[40 14 18 7 6]  [16 67 37 18 14]  [18 37 89 45 21]  [10 19 49 89 41]  [ 7 8 31 56 32]]  precision recall f1-score support  blocker 0.44 0.47 0.45 85  critical 0.46 0.44 0.45 152  major 0.40 0.42 0.41 210  minor 0.41 0.43 0.42 208  trivial 0.28 0.24 0.26 134  micro avg 0.40 0.40 0.40 789  macro avg 0.40 0.40 0.40 789  weighted avg 0.40 0.40 0.40 789 | Accuracy: 0.39765024853140535  F1 score: 0.3980701555106906  Confusion Matrix: [[ 53 56 81 15 14]  [ 54 129 159 55 35]  [ 92 177 465 100 61]  [ 15 53 116 167 65]  [ 12 34 73 66 66]]  precision recall f1-score support  blocker 0.23 0.24 0.24 219  critical 0.29 0.30 0.29 432  major 0.52 0.52 0.52 895  minor 0.41 0.40 0.41 416  trivial 0.27 0.26 0.27 251  micro avg 0.40 0.40 0.40 2213  macro avg 0.35 0.34 0.35 2213  weighted avg 0.40 0.40 0.40 2213 |
| **Mozilla with k=10** | **Eclipse with k=10** |
| Accuracy: 0.4017743979721166  F1 score: 0.39981286742214495  Confusion Matrix: [[40 14 18 7 6]  [16 67 37 18 14]  [18 37 89 45 21]  [10 19 49 89 41]  [ 7 8 31 56 32]]  precision recall f1-score support  blocker 0.44 0.47 0.45 85  critical 0.46 0.44 0.45 152  major 0.40 0.42 0.41 210  minor 0.41 0.43 0.42 208  trivial 0.28 0.24 0.26 134  micro avg 0.40 0.40 0.40 789  macro avg 0.40 0.40 0.40 789  weighted avg 0.40 0.40 0.40 789 |  |
| **Mozilla with k=15** | **Eclipse with k=15** |
| Accuracy: 0.4017743979721166  F1 score: 0.39981286742214495  Confusion Matrix: [[40 14 18 7 6]  [16 67 37 18 14]  [18 37 89 45 21]  [10 19 49 89 41]  [ 7 8 31 56 32]]  precision recall f1-score support  blocker 0.44 0.47 0.45 85  critical 0.46 0.44 0.45 152  major 0.40 0.42 0.41 210  minor 0.41 0.43 0.42 208  trivial 0.28 0.24 0.26 134  micro avg 0.40 0.40 0.40 789  macro avg 0.40 0.40 0.40 789  weighted avg 0.40 0.40 0.40 789 |  |
| **Mozilla with k=20** | **Eclipse with k=20** |
| Accuracy: 0.4017743979721166  F1 score: 0.39981286742214495  Confusion Matrix: [[40 14 18 7 6]  [16 67 37 18 14]  [18 37 89 45 21]  [10 19 49 89 41]  [ 7 8 31 56 32]]  precision recall f1-score support  blocker 0.44 0.47 0.45 85  critical 0.46 0.44 0.45 152  major 0.40 0.42 0.41 210  minor 0.41 0.43 0.42 208  trivial 0.28 0.24 0.26 134  micro avg 0.40 0.40 0.40 789  macro avg 0.40 0.40 0.40 789  weighted avg 0.40 0.40 0.40 789 |  |
| **Mozilla with k=25** | **Eclipse with k=25** |
| Accuracy: 0.4017743979721166  F1 score: 0.39981286742214495  Confusion Matrix: [[40 14 18 7 6]  [16 67 37 18 14]  [18 37 89 45 21]  [10 19 49 89 41]  [ 7 8 31 56 32]]  precision recall f1-score support  blocker 0.44 0.47 0.45 85  critical 0.46 0.44 0.45 152  major 0.40 0.42 0.41 210  minor 0.41 0.43 0.42 208  trivial 0.28 0.24 0.26 134  micro avg 0.40 0.40 0.40 789  macro avg 0.40 0.40 0.40 789  weighted avg 0.40 0.40 0.40 789 |  |

**KNN built in Results**

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| **Mozilla with k=1** | **Eclipse with k=1** |
| Accuracy: 0.4017743979721166  F1 score: 0.40023020868189185  Confusion Matrix: [[46 13 13 8 5]  [ 8 71 38 21 14]  [18 43 78 45 26]  [11 14 47 90 46]  [ 8 10 35 49 32]]  precision recall f1-score support  blocker 0.51 0.54 0.52 85  critical 0.47 0.47 0.47 152  major 0.37 0.37 0.37 210  minor 0.42 0.43 0.43 208  trivial 0.26 0.24 0.25 134  micro avg 0.40 0.40 0.40 789  macro avg 0.41 0.41 0.41 789  weighted avg 0.40 0.40 0.40 789 | Accuracy: 0.4053321283325802  F1 score: 0.4052719960335468  Confusion Matrix: [[ 48 52 81 27 11]  [ 49 137 172 41 33]  [ 78 162 457 130 68]  [ 16 51 96 183 70]  [ 9 38 66 66 72]]  precision recall f1-score support  blocker 0.24 0.22 0.23 219  critical 0.31 0.32 0.31 432  major 0.52 0.51 0.52 895  minor 0.41 0.44 0.42 416  trivial 0.28 0.29 0.29 251  micro avg 0.41 0.41 0.41 2213  macro avg 0.35 0.35 0.35 2213  weighted avg 0.41 0.41 0.41 2213 |
| **Mozilla with k=5** | **Eclipse with k=5** |
| Accuracy: 0.43979721166032953  F1 score: 0.42804913641892933  Confusion Matrix: [[ 52 9 9 11 4]  [ 5 85 40 16 6]  [ 16 42 102 43 7]  [ 8 17 57 90 36]  [ 6 15 41 54 18]]  precision recall f1-score support  blocker 0.60 0.61 0.60 85  critical 0.51 0.56 0.53 152  major 0.41 0.49 0.44 210  minor 0.42 0.43 0.43 208  trivial 0.25 0.13 0.18 134  micro avg 0.44 0.44 0.44 789  macro avg 0.44 0.44 0.44 789  weighted avg 0.42 0.44 0.43 789 | Accuracy: 0.44374152733845457  F1 score: 0.4349698523947445  Confusion Matrix: [[ 72 36 92 16 3]  [ 44 144 207 24 13]  [ 80 154 538 98 25]  [ 17 43 148 175 33]  [ 13 41 79 65 53]]  precision recall f1-score support  blocker 0.32 0.33 0.32 219  critical 0.34 0.33 0.34 432  major 0.51 0.60 0.55 895  minor 0.46 0.42 0.44 416  trivial 0.42 0.21 0.28 251  micro avg 0.44 0.44 0.44 2213  macro avg 0.41 0.38 0.39 2213  weighted avg 0.44 0.44 0.43 2213 |
| **Mozilla with k=10** | **Eclipse with k=10** |
| Accuracy: 0.4524714828897338  F1 score: 0.45066800991217754  Confusion Matrix: [[ 47 7 17 12 2]  [ 4 78 49 14 7]  [ 11 28 109 47 15]  [ 8 12 64 91 33]  [ 2 6 37 57 32]]  precision recall f1-score support  blocker 0.65 0.55 0.60 85  critical 0.60 0.51 0.55 152  major 0.39 0.52 0.45 210  minor 0.41 0.44 0.42 208  trivial 0.36 0.24 0.29 134  micro avg 0.45 0.45 0.45 789  macro avg 0.48 0.45 0.46 789  weighted avg 0.46 0.45 0.45 789 | Accuracy: 0.4631721644826028  F1 score: 0.44239947088490783  Confusion Matrix: [[ 54 33 116 13 3]  [ 35 123 240 25 9]  [ 70 99 620 93 13]  [ 14 23 170 179 30]  [ 7 34 93 68 49]]  precision recall f1-score support  blocker 0.30 0.25 0.27 219  critical 0.39 0.28 0.33 432  major 0.50 0.69 0.58 895  minor 0.47 0.43 0.45 416  trivial 0.47 0.20 0.28 251  micro avg 0.46 0.46 0.46 2213  macro avg 0.43 0.37 0.38 2213  weighted avg 0.45 0.46 0.44 2213 |
| **Mozilla with k=15** | **Eclipse with k=15** |
| Accuracy: 0.4524714828897338  F1 score: 0.45034874249321133  Confusion Matrix: [[ 48 3 22 8 4]  [ 4 68 55 13 12]  [ 9 16 123 44 18]  [ 5 6 71 93 33]  [ 3 3 40 63 25]]  precision recall f1-score support  blocker 0.70 0.56 0.62 85  critical 0.71 0.45 0.55 152  major 0.40 0.59 0.47 210  minor 0.42 0.45 0.43 208  trivial 0.27 0.19 0.22 134  micro avg 0.45 0.45 0.45 789  macro avg 0.50 0.45 0.46 789  weighted avg 0.47 0.45 0.45 789 | Accuracy: 0.4744690465431541  F1 score: 0.44812115357458027  Confusion Matrix: [[ 56 29 118 11 5]  [ 30 112 249 29 12]  [ 55 79 655 95 11]  [ 9 31 175 179 22]  [ 2 31 103 67 48]]  precision recall f1-score support  blocker 0.37 0.26 0.30 219  critical 0.40 0.26 0.31 432  major 0.50 0.73 0.60 895  minor 0.47 0.43 0.45 416  trivial 0.49 0.19 0.28 251  micro avg 0.47 0.47 0.47 2213  macro avg 0.45 0.37 0.39 2213  weighted avg 0.46 0.47 0.45 2213 |
| **Mozilla with k=20** | **Eclipse with k=20** |
| Accuracy: 0.45754119138149557  F1 score: 0.4538664921800399  Confusion Matrix: [[ 49 2 20 12 2]  [ 3 65 57 18 9]  [ 8 13 127 44 18]  [ 5 4 75 98 26]  [ 1 0 43 68 22]]  precision recall f1-score support  blocker 0.74 0.58 0.65 85  critical 0.77 0.43 0.55 152  major 0.39 0.60 0.48 210  minor 0.41 0.47 0.44 208  trivial 0.29 0.16 0.21 134  micro avg 0.46 0.46 0.46 789  macro avg 0.52 0.45 0.46 789  weighted avg 0.49 0.46 0.45 789 | Accuracy: 0.4830546769091731  F1 score: 0.4502122439554516  Confusion Matrix: [[ 49 26 129 10 5]  [ 29 101 264 28 10]  [ 49 62 684 87 13]  [ 8 24 179 190 15]  [ 2 26 108 70 45]]  precision recall f1-score support  blocker 0.36 0.22 0.28 219  critical 0.42 0.23 0.30 432  major 0.50 0.76 0.61 895  minor 0.49 0.46 0.47 416  trivial 0.51 0.18 0.27 251  micro avg 0.48 0.48 0.48 2213  macro avg 0.46 0.37 0.38 2213  weighted avg 0.47 0.48 0.45 2213 |
| **Mozilla with k=25** | **Eclipse with k=25** |
| Accuracy: 0.45627376425855515  F1 score: 0.4519424888659653  Confusion Matrix: [[ 49 1 20 12 3]  [ 1 64 58 20 9]  [ 9 12 125 49 15]  [ 2 4 78 103 21]  [ 0 0 45 70 19]]  precision recall f1-score support  blocker 0.80 0.58 0.67 85  critical 0.79 0.42 0.55 152  major 0.38 0.60 0.47 210  minor 0.41 0.50 0.45 208  trivial 0.28 0.14 0.19 134  micro avg 0.46 0.46 0.46 789  macro avg 0.53 0.45 0.46 789  weighted avg 0.50 0.46 0.45 789 | Accuracy: 0.47401717126073206  F1 score: 0.43322877115612  Confusion Matrix: [[ 42 21 141 11 4]  [ 24 89 283 26 10]  [ 42 55 700 86 12]  [ 5 22 197 182 10]  [ 2 26 115 72 36]]  precision recall f1-score support  blocker 0.37 0.19 0.25 219  critical 0.42 0.21 0.28 432  major 0.49 0.78 0.60 895  minor 0.48 0.44 0.46 416  trivial 0.50 0.14 0.22 251  micro avg 0.47 0.47 0.47 2213  macro avg 0.45 0.35 0.36 2213  weighted avg 0.46 0.47 0.43 2213 |

**SVM Results**

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| **Mozilla** | **Eclipse** |
| Accuracy: 0.4740177439797212  F1 score: 0.4662748567600444  Confusion Matrix: [[ 39 3 28 15 0]  [ 5 62 68 15 2]  [ 2 21 130 51 6]  [ 1 5 65 117 20]  [ 1 3 36 68 26]]  precision recall f1-score support  blocker 0.81 0.46 0.59 85  critical 0.66 0.41 0.50 152  major 0.40 0.62 0.48 210  minor 0.44 0.56 0.49 208  trivial 0.48 0.19 0.28 134  micro avg 0.47 0.47 0.47 789  macro avg 0.56 0.45 0.47 789  weighted avg 0.52 0.47 0.47 789 | Accuracy: 0.49796656122910077  F1 score: 0.43645194889682704  Confusion Matrix: [[ 30 15 167 3 4]  [ 12 91 309 18 2]  [ 23 12 800 54 6]  [ 3 6 228 161 18]  [ 2 14 161 54 20]]  precision recall f1-score support  blocker 0.43 0.14 0.21 219  critical 0.66 0.21 0.32 432  major 0.48 0.89 0.62 895  minor 0.56 0.39 0.46 416  trivial 0.40 0.08 0.13 251  micro avg 0.50 0.50 0.50 2213  macro avg 0.50 0.34 0.35 2213  weighted avg 0.52 0.50 0.44 2213 |

**Naïve Bayes Results**

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| **Mozilla** | **Eclipse** |
| Accuracy: 0.38276299112801015  F1 score: 0.3848940132022123  Confusion Matrix: [[39 18 15 7 6]  [14 68 32 10 28]  [ 6 50 82 24 48]  [ 0 41 38 55 74]  [ 2 20 29 25 58]]  precision recall f1-score support  blocker 0.64 0.46 0.53 85  critical 0.35 0.45 0.39 152  major 0.42 0.39 0.40 210  minor 0.45 0.26 0.33 208  trivial 0.27 0.43 0.33 134  micro avg 0.38 0.38 0.38 789  macro avg 0.43 0.40 0.40 789  weighted avg 0.41 0.38 0.38 789 | Accuracy: 0.3343877089923181  F1 score: 0.33036283339487194  Confusion Matrix: [[113 38 36 22 10]  [101 122 80 89 40]  [216 138 205 239 97]  [ 40 24 50 217 85]  [ 27 27 14 100 83]]  precision recall f1-score support  blocker 0.23 0.52 0.32 219  critical 0.35 0.28 0.31 432  major 0.53 0.23 0.32 895  minor 0.33 0.52 0.40 416  trivial 0.26 0.33 0.29 251  micro avg 0.33 0.33 0.33 2213  macro avg 0.34 0.38 0.33 2213  weighted avg 0.40 0.33 0.33 2213 |

**GRU Results**

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| **Mozilla** | **Eclipse** |
| Accuracy: 0.43219264892268694  F1 score: 0.4204810896159289  Confusion Matrix: [[ 28 16 28 7 6]  [ 3 69 58 18 4]  [ 1 22 121 60 6]  [ 2 13 70 104 19]  [ 0 6 36 73 19]]  precision recall f1-score support  blocker 0.82 0.33 0.47 85  critical 0.55 0.45 0.50 152  major 0.39 0.58 0.46 210  minor 0.40 0.50 0.44 208  trivial 0.35 0.14 0.20 134  micro avg 0.43 0.43 0.43 789  macro avg 0.50 0.40 0.41 789  weighted avg 0.46 0.43 0.42 789 | Accuracy: 0.4708540442837777  F1 score: 0.4063087912536809  Confusion Matrix: [[ 13 30 171 4 1]  [ 4 111 296 16 5]  [ 6 56 777 50 6]  [ 1 11 272 117 15]  [ 0 24 144 59 24]]  precision recall f1-score support  blocker 0.54 0.06 0.11 219  critical 0.48 0.26 0.33 432  major 0.47 0.87 0.61 895  minor 0.48 0.28 0.35 416  trivial 0.47 0.10 0.16 251  micro avg 0.47 0.47 0.47 2213  macro avg 0.49 0.31 0.31 2213  weighted avg 0.48 0.47 0.41 2213 |

**LSTM Results**

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| **Mozilla** | **Eclipse** |
| Accuracy: 0.4144486692015209  F1 score: 0.3970052346292454  Confusion Matrix: [[ 35 9 25 12 4]  [ 4 65 49 27 7]  [ 4 33 94 75 4]  [ 0 18 53 123 14]  [ 0 10 40 74 10]]  precision recall f1-score support  blocker 0.81 0.41 0.55 85  critical 0.48 0.43 0.45 152  major 0.36 0.45 0.40 210  minor 0.40 0.59 0.47 208  trivial 0.26 0.07 0.12 134  micro avg 0.41 0.41 0.41 789  macro avg 0.46 0.39 0.40 789  weighted avg 0.42 0.41 0.40 789 | Accuracy: 0.4591052869408043  F1 score: 0.3943497643548672  Confusion Matrix: [[ 24 25 163 7 0]  [ 8 84 318 15 7]  [ 18 38 771 53 15]  [ 6 6 264 120 20]  [ 0 20 163 51 17]]  precision recall f1-score support  blocker 0.43 0.11 0.17 219  critical 0.49 0.19 0.28 432  major 0.46 0.86 0.60 895  minor 0.49 0.29 0.36 416  trivial 0.29 0.07 0.11 251  micro avg 0.46 0.46 0.46 2213  macro avg 0.43 0.30 0.30 2213  weighted avg 0.45 0.46 0.39 2213 |

**GRU with embedding layer Results**

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| **Mozilla** | **Eclipse** |
| Accuracy: 0.4017743979721166  F1 score: 0.40023020868189185  Confusion Matrix: [[46 13 13 8 5]  [ 8 71 38 21 14]  [18 43 78 45 26]  [11 14 47 90 46]  [ 8 10 35 49 32]]  precision recall f1-score support  blocker 0.51 0.54 0.52 85  critical 0.47 0.47 0.47 152  major 0.37 0.37 0.37 210  minor 0.42 0.43 0.43 208  trivial 0.26 0.24 0.25 134  micro avg 0.40 0.40 0.40 789  macro avg 0.41 0.41 0.41 789  weighted avg 0.40 0.40 0.40 789 | Accuracy: 0.4053321283325802  F1 score: 0.4052719960335468  Confusion Matrix: [[ 48 52 81 27 11]  [ 49 137 172 41 33]  [ 78 162 457 130 68]  [ 16 51 96 183 70]  [ 9 38 66 66 72]]  precision recall f1-score support  blocker 0.24 0.22 0.23 219  critical 0.31 0.32 0.31 432  major 0.52 0.51 0.52 895  minor 0.41 0.44 0.42 416  trivial 0.28 0.29 0.29 251  micro avg 0.41 0.41 0.41 2213  macro avg 0.35 0.35 0.35 2213  weighted avg 0.41 0.41 0.41 2213 |

**LSTM with embedding layer Results**

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| **Mozilla** | **Eclipse** |
| Accuracy: 0.4017743979721166  F1 score: 0.40023020868189185  Confusion Matrix: [[46 13 13 8 5]  [ 8 71 38 21 14]  [18 43 78 45 26]  [11 14 47 90 46]  [ 8 10 35 49 32]]  precision recall f1-score support  blocker 0.51 0.54 0.52 85  critical 0.47 0.47 0.47 152  major 0.37 0.37 0.37 210  minor 0.42 0.43 0.43 208  trivial 0.26 0.24 0.25 134  micro avg 0.40 0.40 0.40 789  macro avg 0.41 0.41 0.41 789  weighted avg 0.40 0.40 0.40 789 | Accuracy: 0.4053321283325802  F1 score: 0.4052719960335468  Confusion Matrix: [[ 48 52 81 27 11]  [ 49 137 172 41 33]  [ 78 162 457 130 68]  [ 16 51 96 183 70]  [ 9 38 66 66 72]]  precision recall f1-score support  blocker 0.24 0.22 0.23 219  critical 0.31 0.32 0.31 432  major 0.52 0.51 0.52 895  minor 0.41 0.44 0.42 416  trivial 0.28 0.29 0.29 251  micro avg 0.41 0.41 0.41 2213  macro avg 0.35 0.35 0.35 2213  weighted avg 0.41 0.41 0.41 2213 |