Quadratic Structures Complexity Analysis Report
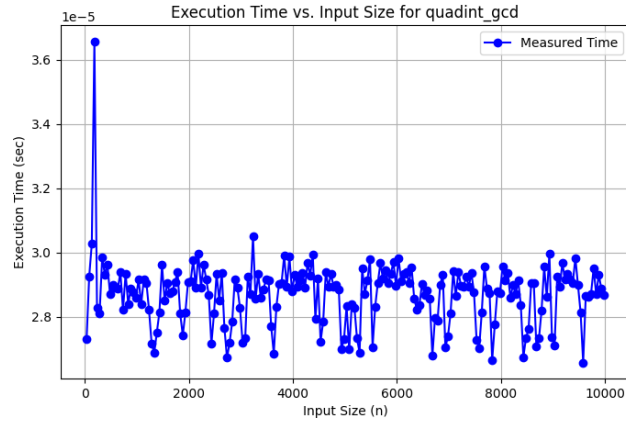
Complexity Analysis for `quadint_gcd`

Best Fit Complexity: `Constant: time = 0.00027 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |————————|———————-| | Constant: time = 0.00027 (sec) | 4.1E-08 | | Linear: time = 0.00027 + 2.9E-10n (sec) | 4.1E-08 | | Quadratic: time = 0.00027 + 3.7E-14n^2 (sec) | 4.1E-08 | | Cubic: time = 0.00027 + 3.2E-18n^3 (sec) | 4.1E-08 | | Polynomial: time = 0.00031 x^-0.022 (sec) | 4E-08 | | Logarithmic: time = 0.00032 + -5.9E-06$log(n)$ (sec) | 3.9E-08 | | Linearithmic: time = 0.00027 + 4E-11n$log(n)$ (sec) | 4.1E-08 | | Exponential: time = 0.00026 1^n (sec) | 4.2E-08 |

Execution Time vs. Input Size Plot:

Complexity Analysis for `quadint_exponentiation`

Best Fit Complexity: `Constant: time = 0.0001 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |————————|———————-| | Constant: time = 0.0001 (sec) | 4.8E-10 | | Linear: time = 0.00011 + -1.7E-09n (sec) | 1.8E-10 | | Quadratic: time = 0.00011 + -1.3E-13n^2 (sec) | 3E-10 | | Cubic: time = 0.0001 + -1.1E-17n^3 (sec) | 3.6E-10 | | Polynomial: time = 0.00012 x^-0.019 (sec) | 2.2E-10 | | Logarithmic: time = 0.00012 + -2E-06$log(n)$ (sec) | 2.1E-10 | | Linearithmic: time = 0.00011 + -1.8E-10n$log(n)$ (sec) | 2E-10 | | Exponential: time = 0.00011 1^n (sec) | 1.7E-10 |
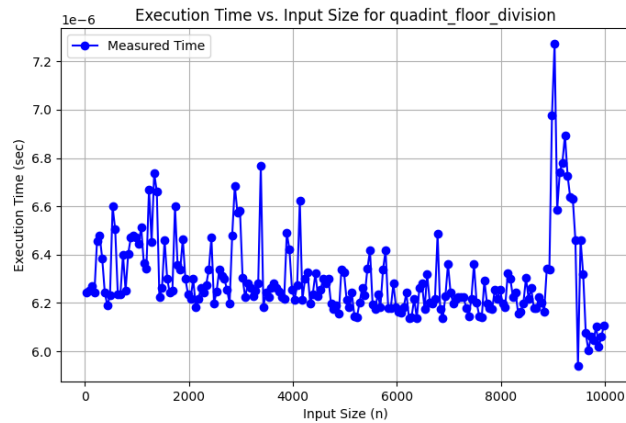
Execution Time vs. Input Size Plot:

Complexity Analysis for `quadint_floor_division`

Best Fit Complexity: `Constant: time = 5.2E-05 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |——————————|———————-| | Constant: time = 5.2E-05 (sec) | 1.7E-10 | | Linear: time = 5.8E-05 + -1.2E-09n (sec) | 2.4E-11 | | Quadratic: time = 5.6E-05 + -1E-13n^2 (sec) | 4.6E-11 | | Cubic: time = 5.5E-05 + -9.8E-18n^3 (sec) | 6.5E-11 | | Polynomial: time = 6.7E-05 $x^{-0.034}$ (sec) | 4.5E-11 | | Logarithmic: time = 6.6E-05 + -1.8E-06$log(n)$ (sec) | 4.1E-11 | | Linearithmic: time = 5.7E-05 + -1.3E-10$nlog(n)$ (sec) | 2.7E-11 | | Exponential: time = 5.8E-05 1^n (sec) | 2.3E-11 |
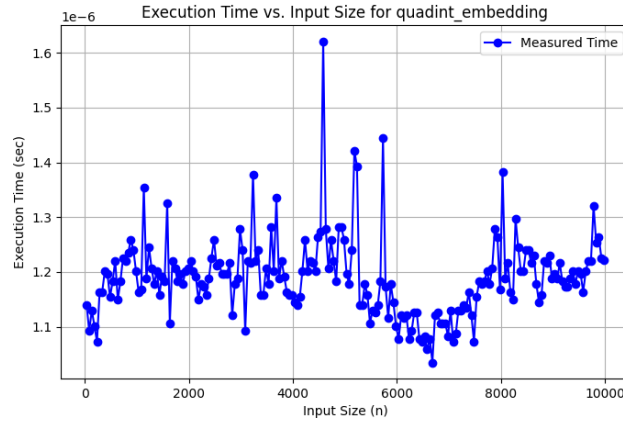
Execution Time vs. Input Size Plot:

Complexity Analysis for `quadint_embedding`

Best Fit Complexity: `Constant: time = 5.4E-06 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |—————————|——————-| | Constant: time = 5.4E-06 (sec) | 4.4E-11 | | Linear: time = 7.4E-06 + -4.1E-10n (sec) | 2.6E-11 | | Quadratic: time = 6.4E-06 + -2.9E-14n^2 (sec) | 3.5E-11 | | Cubic: time = 6E-06 + -2.4E-18n^3 (sec) | 3.8E-11 | | Polynomial: time = 1.6E-05 x^-0.14 (sec) | 4.5E-13 | | Logarithmic: time = 1.4E-05 + -1.1E-06$log(n)$ (sec) | 1.6E-12 | | Linearithmic: time = 7.2E-06 + -4.2E-11n$log(n)$ (sec) | 2.8E-11 | | Exponential: time = 6.9E-06 1^n (sec) | 2.6E-11 |

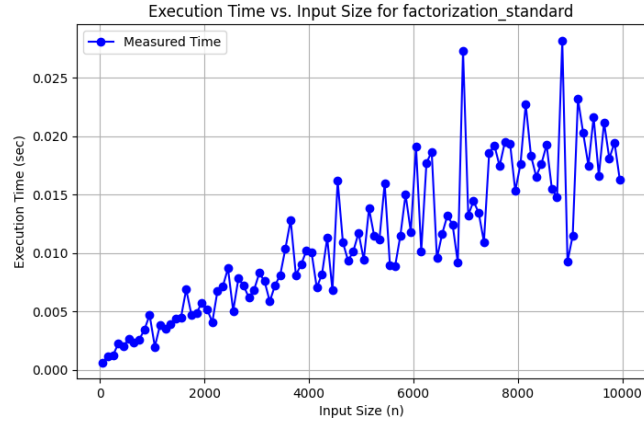**Execution Time vs. Input Size Plot:**

Complexity Analysis for `factorization_standard`

Best Fit Complexity: `Linear: time = 0.014 + 1.7E-05*n (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |—————————|——————-| | Constant: time = 0.099 (sec) | 0.14 | | Linear: time = 0.014 + 1.7E-05n (sec) | 0.11 | | Quadratic: time = 0.048 + 1.5E-09n^2 (sec) | 0.12 | | Cubic: time = 0.064 + 1.3E-13n^3 (sec) | 0.12 | | Polynomial: time = 0.00072 x^0.51 (sec) | 0.14 | | Logarithmic: time = -0.039 + 0.018$log(n)$ (sec) | 0.12 | | Linearithmic: time = 0.02 + 1.8E-06n$log(n)$ (sec) | 0.11 | | Exponential: time = 0.0097 1^n (sec) | 0.14 |

Execution Time vs. Input Size Plot:

Execution Time vs. Input Size for factorization_standard

Complexity Analysis for `factorization_imaginary`

Best Fit Complexity: `Linear: time = -0.011 + 1.7E-05*n (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |————————— |————-| | Constant: time = 0.076 (sec) | 0.11 | | Linear: time = -0.011 + 1.7E-05n (sec) | 0.078 | | Quadratic: time = 0.022 + 1.5E-09n^2 (sec) | 0.083 | | Cubic: time = 0.039 + 1.3E-13n^3 (sec) | 0.09 | | Polynomial: time = 0.00055 x^0.51 (sec) | 0.11 | | Logarithmic: time = -0.042 + 0.015$log(n)$ (sec) | 0.095 | | Linearithmic: time = -0.0053 + 1.9E-06$nlog(n)$ (sec) | 0.078 | | Exponential: time = 0.0058 1^n (sec) | 0.1 |

Execution Time vs. Input Size Plot:

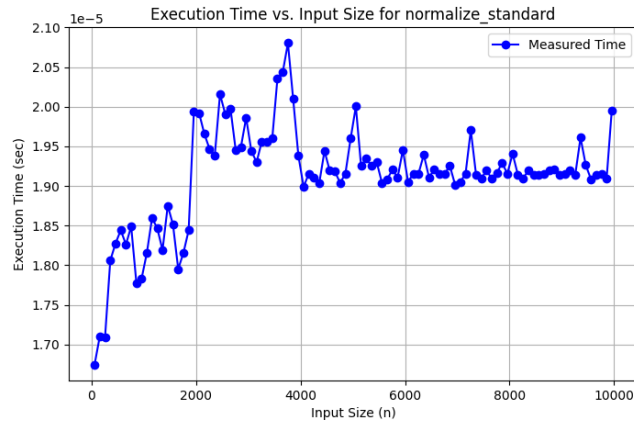Execution Time vs. Input Size for factorization_imaginary

Complexity Analysis for `normalize_standard`

Best Fit Complexity: `Constant: time = 0.00019 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |————————|———————-| | Constant: time = 0.00019 (sec) | 4.8E-10 | | Linear: time = 0.00018 + 1.2E-09n *(sec)* | *3.3E-10* | | *Quadratic: time = 0.00019 + 7.9E-14*n^2 (sec) | 4.1E-10 | | Cubic: time = 0.00019 + 6.5E-18n^3 *(sec)* | *4.3E-10* | | *Polynomial: time = 0.00016* x^0.018 (sec) | 8.4E-11 | | Logarithmic: time = 0.00016 + 3.2E-06$log(n)$ *(sec)* | *8.2E-11* | | *Linearithmic: time = 0.00018 + 1.2E-10*n$log(n)$ *(sec)* | *3.4E-10* | | *Exponential: time = 0.00018* 1^n (sec) | 3.3E-10 |

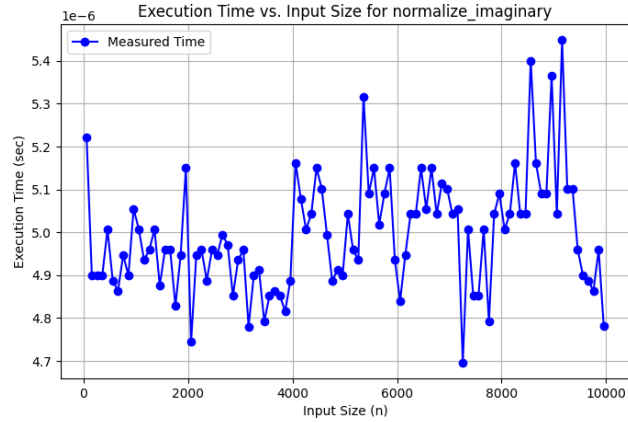**Execution Time vs. Input Size Plot:**

Complexity Analysis for `normalize_imaginary`

Best Fit Complexity: `Constant: time = 4.3E-05 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |————————|———————-| | Constant: time = 4.3E-05 (sec) | 1.9E-10 | | Linear: time = 4.8E-05 + -9.3E-10n *(sec)* | *9.9E-11* | | *Quadratic: time = 4.6E-05 + -6.7E-14*n^2 (sec) | 1.4E-10 | | Cubic: time = 4.5E-05 + -5.6E-18n^3 *(sec)* | *1.5E-10* | | *Polynomial: time = 6.1E-05* x^-0.045 (sec) | 8.4E-12 | | Logarithmic: time = 6E-05 + -2.2E-06$log(n)$ *(sec)* | *9.2E-12* | | *Linearithmic: time = 4.7E-05 + -9.5E-11*n$log(n)$ *(sec)* | *1.1E-10* | | *Exponential: time = 4.8E-05* 1^n (sec) | 9.6E-11 |

Execution Time vs. Input Size Plot:

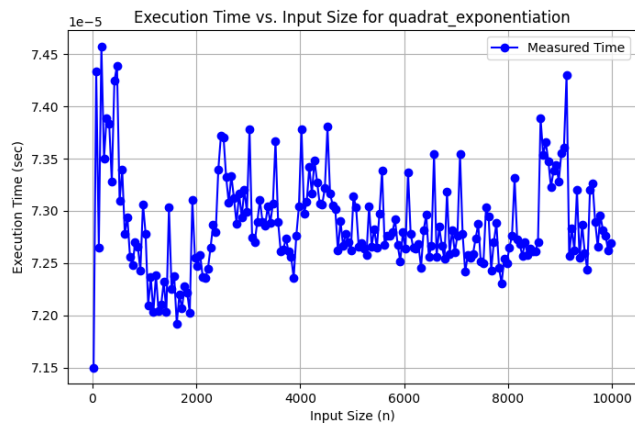Execution Time vs. Input Size for normalize_imaginary

Complexity Analysis for `quadrat_exponentiation`

Best Fit Complexity: `Constant: time = 0.00072 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |————————|————-| | Constant: time = 0.00072 (sec) | 1.9E-09 | | Linear: time = 0.0007 + 3.5E-09n (sec) | 6E-10 | | Quadratic: time = 0.00071 + 3.1E-13n^2 (sec) | 7.9E-10 | | Cubic: time = 0.00071 + 2.9E-17n^3 (sec) | 9.8E-10 | | Polynomial: time = 0.00069 $x^{0.005}$ (sec) | 1E-09 | | Logarithmic: time = 0.00069 + 3.6E-06$log(n)$ (sec) | 1E-09 | | Linearithmic: time = 0.0007 + 3.8E-10$nlog(n)$ (sec) | 6.2E-10 | | Exponential: time = 0.0007 1^n (sec) | 6.1E-10 |

Execution Time vs. Input Size Plot:

Execution Time vs. Input Size for quadrat_exponentiation

Complexity Analysis for `quadrat_embedding`

Best Fit Complexity: `Constant: time = 5.9E-06 (sec)`

Detailed Fit Residuals: | Complexity Class | Residual | |—————————|———————-| | Constant: time = 5.9E-06 (sec) | 2.2E-11 | | Linear: time = 7.3E-06 + -2.9E-10n (sec) | 1.4E-11 | | Quadratic: time = 6.6E-06 + -2E-14n^2 (sec) | 1.7E-11 | | Cubic: time = 6.4E-06 + -1.7E-18n^3 (sec) | 1.9E-11 | | Polynomial: time = 1E-05 x^-0.075 (sec) | 1.6E-13 | | Logarithmic: time = 1E-05 + -5.6E-07$log(n)$ (sec) | 3.8E-13 | | Linearithmic: time = 7.2E-06 + -3E-11n$log(n)$ (sec) | 1.4E-11 | | Exponential: time = 7.1E-06 1^n (sec) | 1.3E-11 |

Execution Time vs. Input Size Plot: