**Benchmarking JavaScript Frameworks**

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| Lines of Code | (Park, 1992) |
| Cyclomatic Complexity | (McCabe, 1976) |
| Halstead Complexity | (Halstead, 1977) |
| Maintainability Index | (Oman & Hagemeister, 1992) |
| Database metrics | (Calero, Piattini, & Genero, 2001) |
| Page-load/render-time | (Christodoulou & Gizas, 2014), (“Metrics - WebPagetest Documentation,” 2008) |
| Speed index | (“Metrics - WebPagetest Documentation,” 2008) |
| Render and frame measurements | (“Timeline Event Reference | Web,” n.d.) |

Comparative Evaluation of JavaScript Frameworks

**Size Metrics:** *lines of code (LOC),*

**Complexity Metrics -** *McCabe’s cyclomatic complexity*

**Maintainability Metrics:** Halstead

metrics (*Program Volume* and *Program Level*) and

*Maintainability Index (MI)*.

Open google and find papers of every google lighthouse metrics

Available for <https://ieeexplore.ieee.org/abstract/document/8780515> first contentful paint

write about overview of frameworks in some chapter from paper pattern frameworks and middleware