

# Flutter Technologies for Visualization Research

**FL Chart:** A highly customizable Flutter chart library that supports Line Chart, Bar Chart, Pie Chart, Scatter Chart, and Radar Chart.

- Distributed under the MIT license, meaning it's free and suitable for academic or commercial projects without licensing concerns.
- Allows for a good amount of control over chart appearance, animations, and other interactions.
- While generally efficient for typical dashboard use cases, performance issues and rendering bugs may appear when handling large datasets.

**Syncfusion Flutter Charts:** A Flutter Charts library which includes data visualization widgets such as cartesian and circular charts, to create real-time, interactive, high-performance, animated charts.

- A commercial license is required, though a free community license is available under specific conditions.
- Optimized for large datasets and complicated interactions, making it suitable for data heavy applications.
- Includes advanced functionality such as zooming, panning, tooltips, and legends with minimal custom code.

**Graphic:** A library based on the “grammar of graphics” system, offering immense flexibility in composing unique visualizations.

- Enables the creation of highly customized and unique visualizations beyond traditional chart types.
- Allows full control over user interactions and animated transitions.
- The grammar-based approach provides better capabilities but requires more familiarity with data visualization concepts compared to widget-based libraries.

	<b>FL Chart</b>	<b>Syncfusion Flutter Charts</b>	<b>Graphic</b>
Performance	Good: Lightweight and efficient for common charts and sizes.	Excellent: Optimized for large datasets and complex interactions.	Moderate: Performance depends on complexity of specs and data transformation.
Ease of Use	Excellent: Simple API, easy to get standard charts running quickly.	Good: Many ready-made widgets, but has a very large and complex API.	Moderate: Requires understanding of grammar-based visualization concepts.

	<b>FL Chart</b>	<b>Syncfusion Flutter Charts</b>	<b>Graphic</b>
Customization	Excellent: High control over styling, animations, and interactions.	Excellent: Extensive built-in customizations options.	Excellent: Extremely flexible. Supports custom and non-standard visuals.
Chart Variety	Good: Has a basic selection. Line, bar, pie, scatter, radar, etc.	Excellent: Wide range of chart types and datasets (cartesian, circular, financial, etc.).	Moderate: Fewer pre-made charts, but all fully composable.
Learning Curve	Excellent: Ideal for beginners or quick and simple dashboards.	Moderate: Has a large amount of features and requires time to explore options.	Difficult: Best for developers comfortable with data visualization concepts.
Licensing and Cost	Excellent: Free (MIT License)	Moderate: Commercial (Free community license available.)	Excellent: Free (MIT License)

Compared to Syncfusion Flutter Charts and Graphic, FL Chart excels in simplicity, ease of integration, and accessibility. It provides the necessary chart types and customization options for this project while remaining efficient and fully open source so there are no licensing constraints. Although the other libraries offer more advanced or specialized features, FL Chart offers the best balance between functionality and development efficiency, making it the most suitable choice for this project's visualization needs.

## References

- [1] “Graphic library,” graphic library - Dart API, <https://pub.dev/documentation/graphic/latest/graphic/>
- [2] “Flutter charts: Beautiful & Interactive Live Charts,” Syncfusion, <https://www.syncfusion.com/flutter-widgets/flutter-charts#:~:text=Why%20Choose%20Syncfusion%20Flutter%20Charts,cater%20to%20all%20charting%20scenarios>.
- [3] M. Naeem, “Creating beautiful charts with FL chart package in flutter: A guide for flutter enthusiasts 2024,” The Tech Vate, <https://thetechvate.com/beautiful-charts-with-fl-chart/>
- [4] A. Prasad, “Top flutter charts, plots, visualization packages for line chart, bar chart, radial chart, Pie Chart, sparkline, Speedometer & More: Flutter gems,” Flutter Gems - A Curated List of Top Dart and Flutter packages, <https://fluttermaterials.dev/plots-visualization/>