Title:
Adding Voronoi Diagrams to GEOS

Describe your idea:

1. Introduction: JTS is an API of spatial predicates written in java that has function/methods and algorithm implemented for processing geometry. GEOS is a port for JTS apis from Java to C++.

2. Background: Voronoi Diagrams are a way to divide the region into subspace. Each subspace corresponds to a point, and all the points in that subspace will be closest to that seed point. Voronoi Diagrams are dual to Delaunay Triangles. The latest port of GEOS was of DelaunayTriangulationBuilder class, in which 23 classes were ported. During this project, VoronoiDiagramBuilder class needs to be ported. This will involve figuring out the class, and methods that needs to be ported. Writing the C++ Implementation, the C-API exposure, and relative test cases.

3. The Idea:

a. Porting the Voronoi classes from JTS to GEOS: The Class corresponding VoronoiDiagramBuilder in JTS will be ported. These are the methods and classes that needs to be ported. More may come up while porting, but these are what i have figured out so far: (Bold are to be ported)

- Geometry
- Geometry Factor
- **QuadEdgeSubdivision**:
  - Methods required for **VoronoiDigramBuilder**:
    - **getVoronoiDiagram**
    - **getVoronoiCellPolugons**
    - **getVoronoiCellPolugon**
    - visitTriangle
    - **getVertexUniqueEdges**
    - TriangleCoordinateVisitor
    - **TriangleCircumcenterVisitor**
    - **TriangleEdgeListVisitor**
    - **TriangleVertexListVisitor**
    - **isFrameVertex**
- TriangleVisitor(Interface)

b. Writing C++ testcases: This will include porting the VoronoiTest file from JTS to GEOS. Further more one or two testcases will be written from scratch.

c. Exposing the functions through C-API: It provides a wrapper for the C++ functions. All the reference functions are implemented in geos_ts_c.cpp. And all the functions that are exposed to the users are defined in geos_c.h and implemented in geos_c.cpp . Such wrapper will be provided for the functions/methods that will be ported for Voronoi Class.

d. Writing C test cases: Test cases to test the Voronoi class methods wrapper functions in geos.h will be written.