Mapserver – Labeling and Circles – my best tips and tricks

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Outline

- Circles with geographic extent
  - Server solution via WMS
- New possibilities with labeling MS 8.0 (+)

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My background

- Land Surveyor – PhD in Cartography
- GRASS user/dev 1987 – 1994
- Mapserver user 2001-2005
- Mapserver user again since 2012
- Senior technical fellow Digital maps at Saab
- SMAC-M on GITHUB – Sea Charts with Mapserver
- Love to author fast and beautiful WMS services

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All examples and scripts are available on GITHUB

https://github.com/LarsSchy/Mapserver-Circles

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My input data

- data/points_3857.csv

```
ID,east,north,distance,label_1,label_2
1,2011184,8247909,40000,Circle 1,Stockholm
2,1847865,8380964,25000,Circle 2,Sala
3,1964448,8367688,35000,Circle 3,Uppsala
4,1901638,8319604,20000,Circle 4,Strängnäs
```

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Circles with geographic extent

- Style – Symbol – Circles doesn't work so well
- Layer – Type Circle is one option:
  https://mapserver.org/mapfile/layer.html
- but … ----- Let us do some experiments !
- There might be other options to do circles

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Layer - type circle

TYPE [chart|circle|line|point|polygon|raster|query]

A circle must be defined by a a minimum bounding rectangle. That is, two points that define the smallest square that can contain it. These two points are the two opposite corners of said box.

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Inline circles

```
LAYER                                  CLASS
    NAME "inline_circles"                  STYLE
    GROUP "default"                            OUTLINECOLOR 0 0 200
    TYPE CIRCLE                                PATTERN 12 6 END
    STATUS default                            WIDTH 6
    FEATURE                                   OPACITY 50
        POINTS                            END
            1971184 8207909           END
            2051184 8287909
        END
    END
```

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Create_Example_1A.sh (bash)

```bash
# create include layers for circles

touch ${INC_CIRCLE_LAYER}

sed 1d $CSV_FILE | \
grep "\\S" --color=none | \
cut -d "," -f 2,3,4 | \
while IFS=, read -r east north radius
do
   east_min=$(echo "${east}-${radius}" | bc)
   east_max=$(echo "${east}+${radius}" | bc)
   north_min=$(echo "${north}-${radius}" | bc)
   north_max=$(echo "${north}+${radius}" | bc)
```

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```
cat << EOF >> ${INC_CIRCLE_LAYER}
LAYER
         NAME "inline_circles"
         GROUP "default"
         TYPE CIRCLE
         STATUS default
         FEATURE
                  POINTS
                           ${east_min} ${north_min}
                           ${east_max} ${north_max}
                  END
         END
         CLASS
                  STYLE
                           OUTLINECOLOR 0 0 200
                           PATTERN 12 6 END
                           WIDTH 6
                           OPACITY 50
                  END
         END
 END
EOF
```
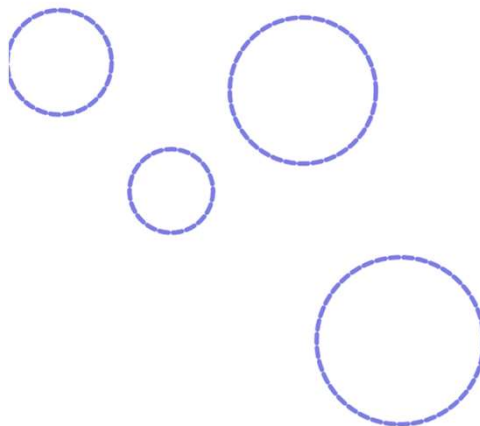
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Inline circles

```
LAYER
    NAME "inline_circles"
    GROUP "default"
    TYPE CIRCLE
    STATUS default
    FEATURE
        POINTS
            1971184 8207909
            2051184 8287909
        END
    END
```

```
CLASS
    STYLE
        OUTLINECOLOR 0 0 200
        PATTERN 12 6 END
        WIDTH 6
        OPACITY 50
    END
END

END
```

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Example 1A with shp2img

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WKT – with Create_circles_1B.sh

```
ID,RADIUS,POINTS
1, 40000, "MULTIPOINT ( 1971184 8207909, 2051184 8287909 )"
2, 25000, "MULTIPOINT ( 1822865 8355964, 1872865 8405964 )"
3, 35000, "MULTIPOINT ( 1929448 8332688, 1999448 8402688 )"
4, 20000, "MULTIPOINT ( 1881638 8299604, 1921638 8339604 )"
```

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Make a VRT to map the WKT

```
<OGRVRTDataSource>
  <OGRVRTLayer name="point_circ_wkt">
            <SrcDataSource relativeToVRT="1">point_circ_wkt.csv</SrcDataSource>
            <GeometryType>wkbMultiPoint</GeometryType>
            <LayerSRS>EPSG:3857</LayerSRS>
            <GeometryField encoding="WKT" field='POINTS' > </GeometryField >
  </OGRVRTLayer>
</OGRVRTDataSource>
```

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Circles from WKT and converted to shape file with ogr2ogr

```
LAYER
    NAME "circles_WKT"
    GROUP "default"
    TYPE CIRCLE
    STATUS default
    DATA point_circ_wkt
    CLASS
        STYLE
            COLOR 0 255 0
            OPACITY 10
            OUTLINECOLOR 0 0 200
            PATTERN 12 6 END
             WIDTH 12
        END
```
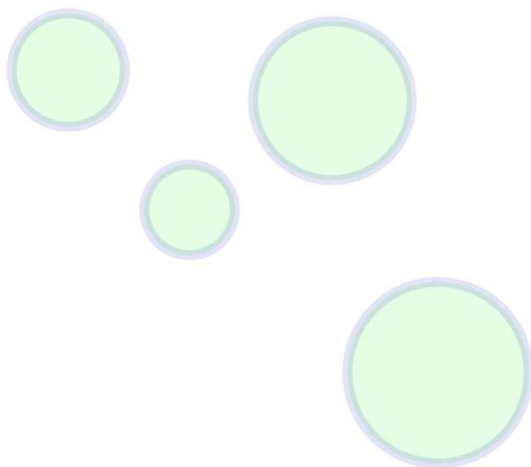
```
        LABEL
            TEXT "HEJ HEJ"
            SIZE 15
            COLOR 0 0 0
        END
    END
END
```

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Example 1B with shp2img

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Option 2

- Create a circles with CIRCULARSTRING

- This time we are not using the TYPE CIRCLE but rather TYPE LINE

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Create_circles_2A.sh

We create a file with circular string objects:

```
ID,WKT
1,"CIRCULARSTRING(2011184 8207909, 2011184  8287909, 2011184  8207909)"
1,"CIRCULARSTRING(1847865 8355964, 1847865  8405964, 1847865  8355964)"
1,"CIRCULARSTRING(1964448 8332688, 1964448  8402688, 1964448  8332688)"
1,"CIRCULARSTRING(1901638 8299604, 1901638  8339604, 1901638  8299604)"
```

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Circle_Example_2A.map

```
LAYER
     NAME "curves_CS"
     TYPE LINE
     GROUP "default"
     CONNECTIONTYPE OGR
     CONNECTION "point_circ_str.csv"
     STATUS ON
```

```
CLASS
   # EXPRESSION ([ID] = 1)
   STYLE
       LINECAP BUTT
       WIDTH 1
       COLOR 255 0 0
       OFFSET 5 -99
       PATTERN 15 6 END
   END
 END
END
```
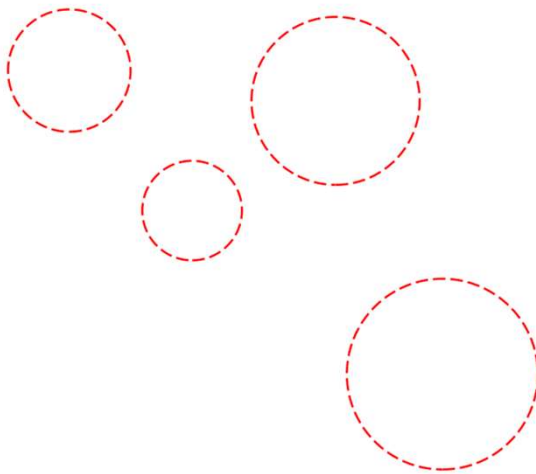
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Example 2A Circular strings

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Create_circles_2B.sh

We create a file with circular string objects with a text label:

```
ID,WKT,LABELTXT
1,"CIRCULARSTRING(2011184 8207909, 2011184  8287909, 2011184  8207909)","Circle 1"
2,"CIRCULARSTRING(1847865 8355964, 1847865  8405964, 1847865  8355964)","Circle 2"
3,"CIRCULARSTRING(1964448 8332688, 1964448  8402688, 1964448  8332688)","Circle 3"
4,"CIRCULARSTRING(1901638 8299604, 1901638  8339604, 1901638  8299604)","Circle 4"
```
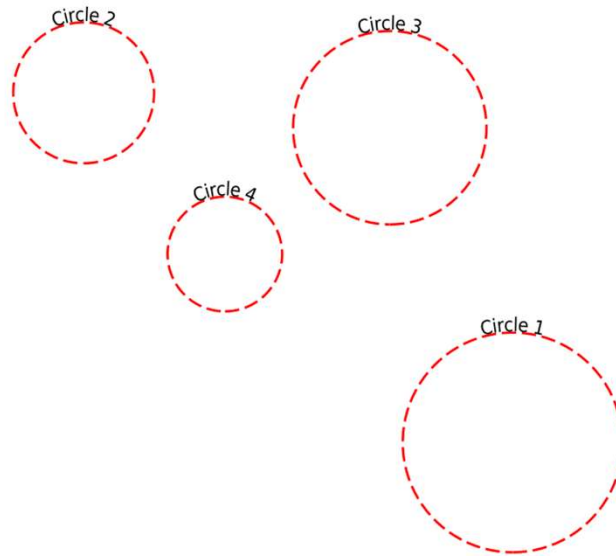
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Circle_Example_2B.map

```
LABELITEM LABELTXT
CLASS
    STYLE
        LINECAP BUTT
        WIDTH 1
        COLOR 255 0 0
        OFFSET 5 -99
        PATTERN 15 6 END
    END
    LABEL
        SIZE 15
        COLOR 0 0 0
        ANGLE FOLLOW
        OFFSET 5 99
    END
END
```

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Example 2B Circular strings with label

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Option 3

Use original csv with a VRT and creating circle with spatialite SQL

```
<OGRVRTDataSource>
    <OGRVRTLayer name='full_circle'>
        <SrcDataSource relativeToVRT="1">points_3857.csv</SrcDataSource>
        <LayerSRS>EPSG:3857</LayerSRS>
        <SrcSQL dialect='sqlite'>
        SELECT ID, distance,
          MakeCircle(CAST(east AS float),CAST(north AS float),
          CAST(distance as float), 3857, 5) as Geometry
          FROM points_3857
        </SrcSQL>
    </OGRVRTLayer>
</OGRVRTDataSource>
```

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Circle_Example_3A.map

```
LAYER
    NAME "circle"
    CONNECTIONTYPE OGR
    CONNECTION "points_3857.vrt"
    DATA full_circle
    STATUS default
    TYPE LINE
    CLASS
            NAME "circle"
            STYLE
                        COLOR 255 94 19
            END
    END
END
```
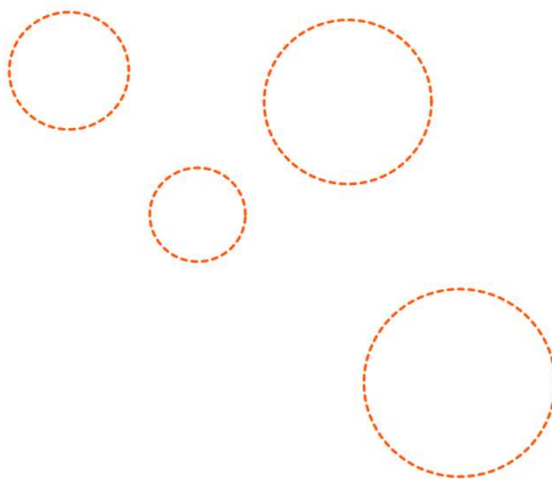
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Example 3A generated with spatialite SQL in a VRT

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VRT with the labels added

```
<OGRVRTLayer name='full_circle'>
    <SrcDataSource relativeToVRT="1">points_3857.csv</SrcDataSource>
    <LayerSRS>EPSG:3857</LayerSRS>
    <SrcSQL dialect='sqlite'>
                SELECT ID, distance,
                MakeCircle(CAST(east AS float),CAST(north AS float),
                CAST(distance as float), 3857, 5) as Geometry, label_1, label_2
                FROM points_3857
    </SrcSQL>
</OGRVRTLayer>
```

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Circle_Example_3A.map

```
CLASS
    NAME "circle"
    STYLE
        WIDTH 3.2
        PATTERN 6 6 END
        COLOR 255 94 19
    END
    LABEL
        TEXT ("[label_1]" + " around " + "[label_2]" + " "
         + tostring([distance],"%.0f") + " radius")
        SIZE 15
        COLOR 200 100 100
        ANGLE FOLLOW
        OFFSET 5 99
    END
END
```

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Example 3B generated with SQL in a VRT with labels
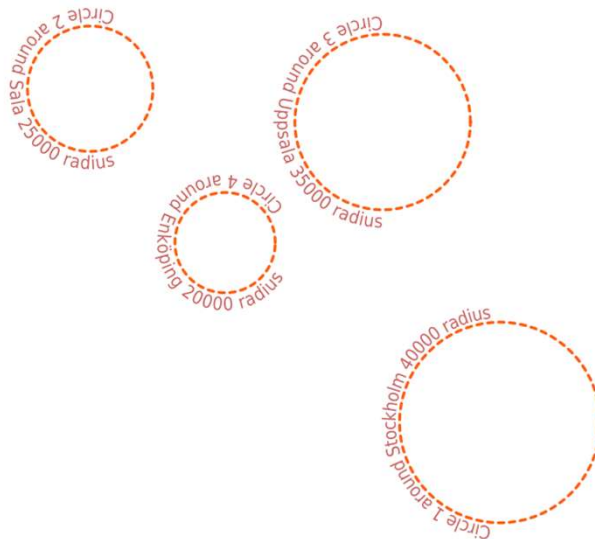
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Add a point layer in the VRT

```
<OGRVRTLayer name="points_3857">
    <SrcDataSource relativeToVRT="1">points_3857.csv</SrcDataSource>
    <GeometryType>wkbPoint</GeometryType>
    <LayerSRS>EPSG:3857</LayerSRS>
    <GeometryField encoding="PointFromColumns" x="east" y="north"/>
</OGRVRTLayer>
```

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Mapfile Layer for the points from the VRT

```
LAYER
    NAME "points"
    GROUP "default"
    CONNECTIONTYPE OGR
    CONNECTION "points_3857_label.vrt"
    DATA points_3857
    STATUS default
  TYPE POINT
  CLASS
        NAME "point"
        STYLE
          SYMBOL "cross1"
          SIZE 15
          COLOR 255 0 0
        END
    END  # Class
END  # Layer
```
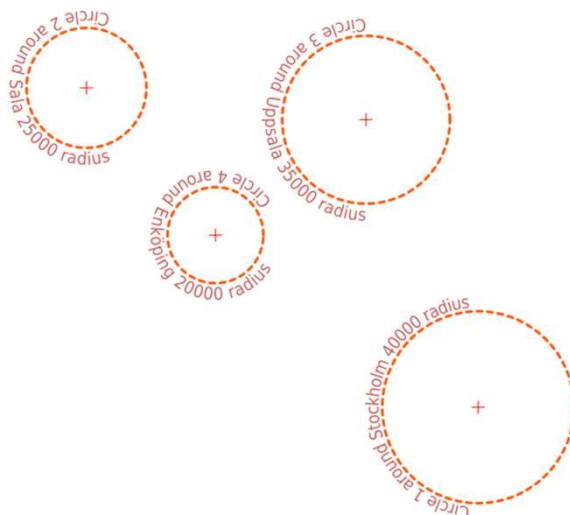
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Example 3C - Point layer added – center of circle

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Mapfile with the text in the middle of circle

```
LAYER
    NAME "points"
    GROUP "default"
    CONNECTIONTYPE OGR
    CONNECTION "points_3857_label.vrt"
    DATA points_3857
    STATUS default
    TYPE POINT
    CLASS
        NAME "point"
        LABEL
            TEXT "[label_2]"
            SIZE 15
            COLOR 0 0 0
            POSITION CC
        END
    END  # Class
END  # Layer
```
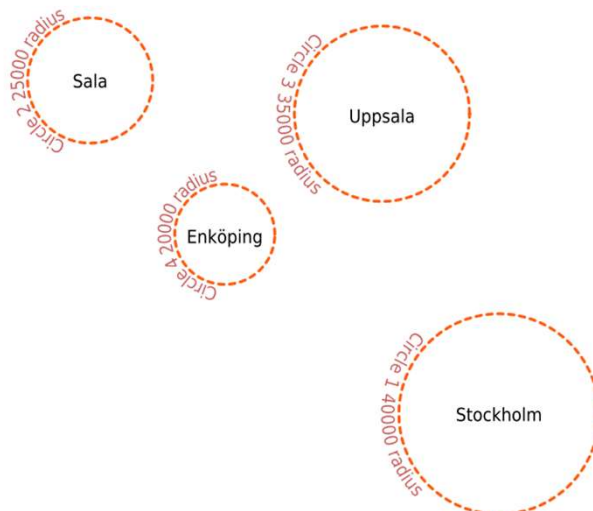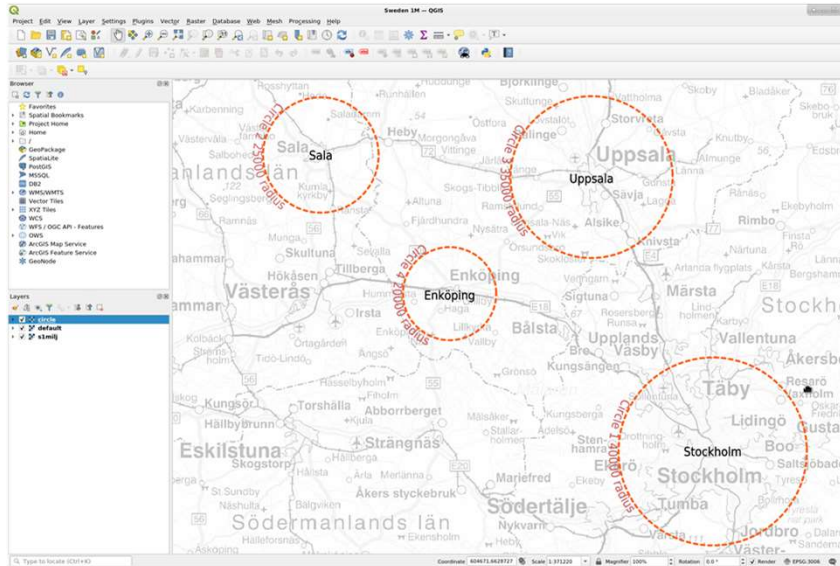
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Example 3D - Text label 2 in the point layer

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Test the Circle WMS service in QGIS

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One more possibility

- Mapserver has a module for creation of Javascript features. I have not tried that yet, but it wouldn't surprise me if it would be possible to create circles there.
- This functionality is not compiled by default

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My findings

- Layer – Type Circle
    - requires creation of new data structure
    - no labeling possibilities
- CIRCULARSTRING
    - also requires creation of new data structure
    - Labeling possible on the line
- VRT with SQL is my favorite
    - Direct access to original data through the VRT
    - Labeling possible

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Bonus features with Spatialite SQL

- You can create other spatial features like polygons, circular arcs, points and circle sectors (pie charts)

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Upcoming label possibilities in Mapserver 8.0(+)

- WIP Medial Axis Approximation GEOMTRANSFORM (#5854)
    - A very interesting initiative from Steve Lime
    - I am keeping my fingers crossed that this comes into place
    - I have carried out some initial tests with "WIP pull-request"
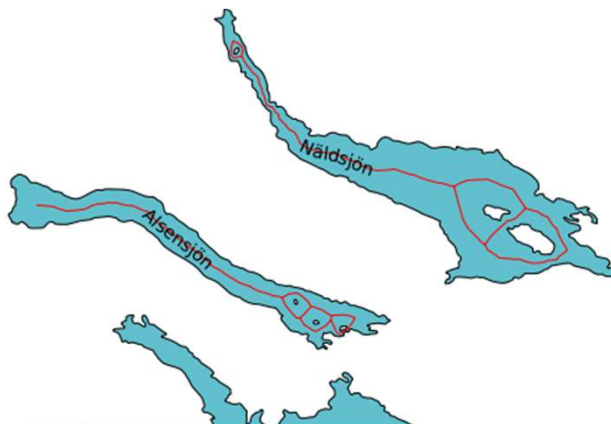
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Lake text labeling

Experiment with Medial Axis Approximation
GEOMTRANSFORM – Swedish 250K map example

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Norwegian Text boxes
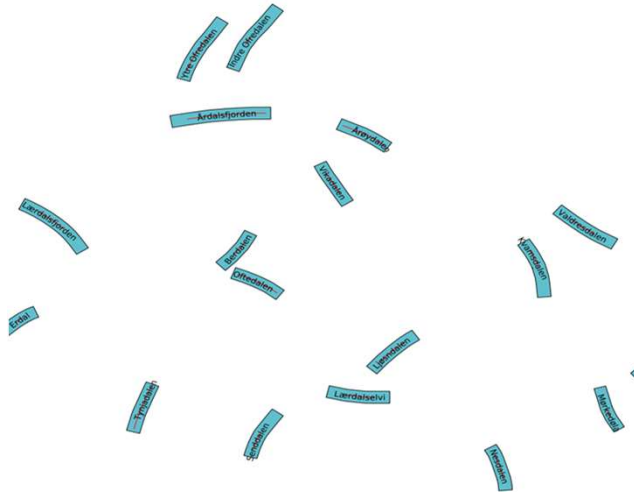
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Thanks for your attention!

The example code can be found at:
https://github.com/LarsSchy/Mapserver-Circles

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