

TIGR Analysis for Operational Environments

Major David Beskow



Systems Engineering Department
United States Military Academy at West Point

April 22, 2012

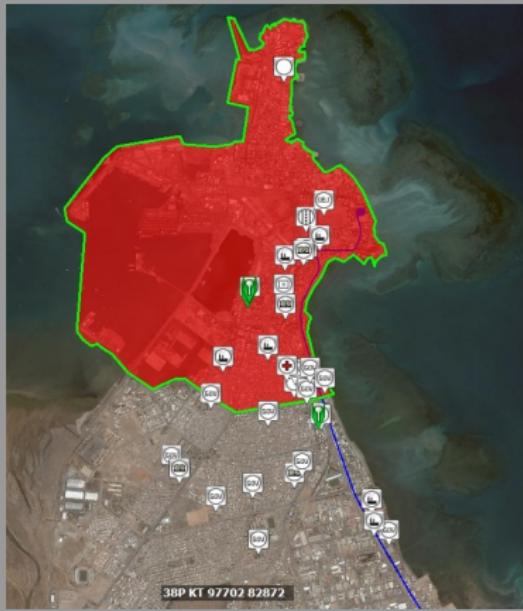


“If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle.”

- Sun Tzu



TIGR System

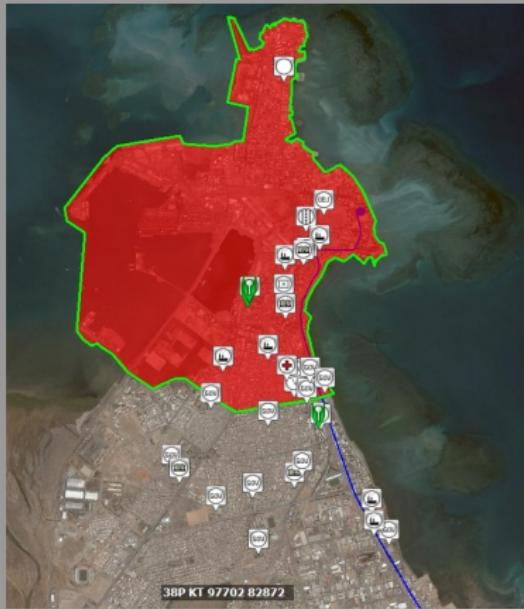


"I cannot imagine not having TIGR, especially if you're in a larger AO or moved AO's, it would be like going in blind."

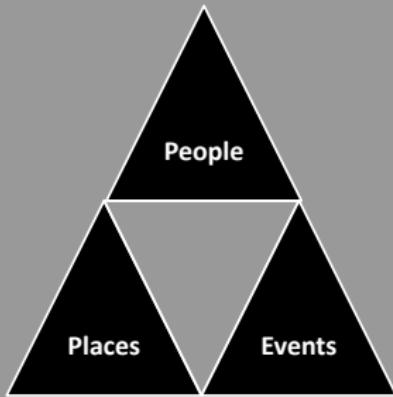
-CPT Michael Cain (C/1-66/1BCT/4ID)



TIGR System



Building Blocks of TIGR



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Tukey's Detective



The Right Tools

® EDA Toolbox

The Right Location

TIGR



Why \mathbb{R} ?



Why R?

TechCrunch
Thomas Cook
New York Times
Benetech
mozilla oDesk
KickStarter NewScientist
okcupid.ing Merck
NIST Bing Lloyd's
Orbitz Marketo
trulia Google
Facebook CARDIODX



Target: ORSA Analyst

One Line Commands

```
plotFreqPoly(tigr.sp,kenya.shp, time="date", col = "blue", size = c(1, 1))
```

- Spatial Points Data (Latitude/Longitude)
- Temporal Field
- Spatial Polygons (shapefiles, easily imported from established data sources)



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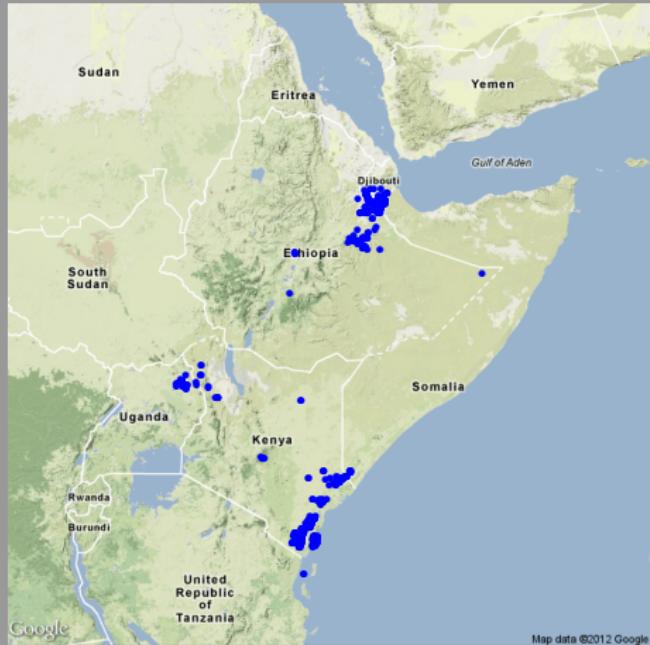
- Spatial Points Data (Latitude/Longitude)
- Temporal Field
- **Spatial Polygons (shapefiles, easily imported from established data sources)**



\mathbb{R}^D
e
m
o



Task Force Horn of Africa

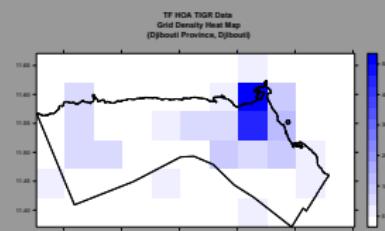
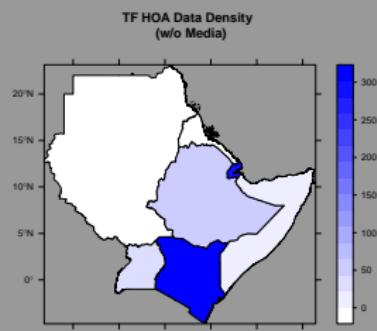
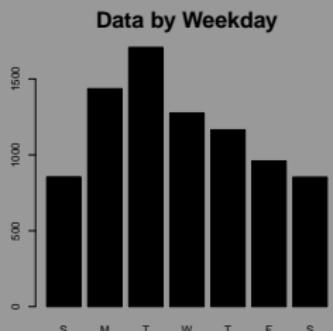
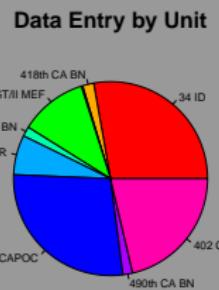
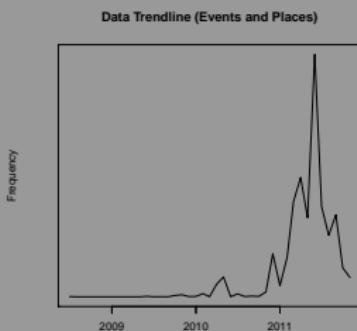
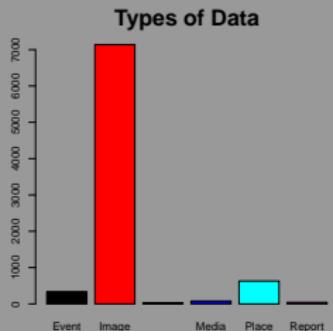


CJTF HOA Mission Statement:

“Conduct operations in the Combined Joint Operations Area to enhance partner nation capacity, promote regional stability, dissuade conflict, and protect US and coalition interests.”

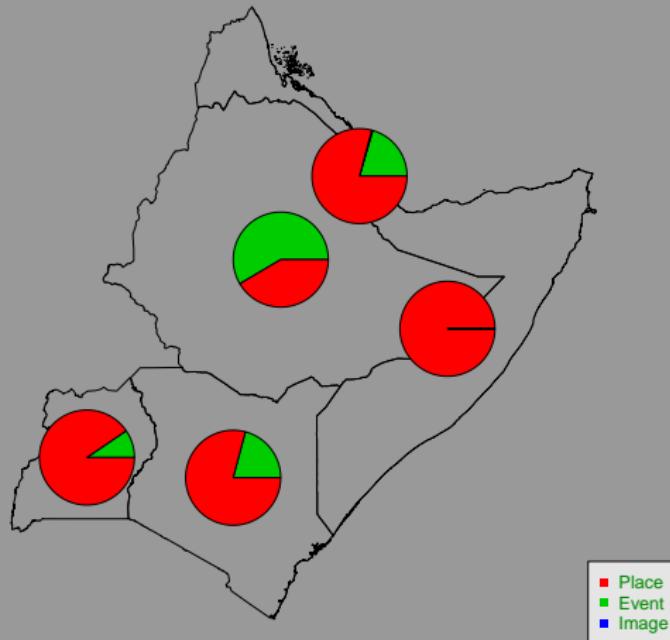


Descriptive Analysis



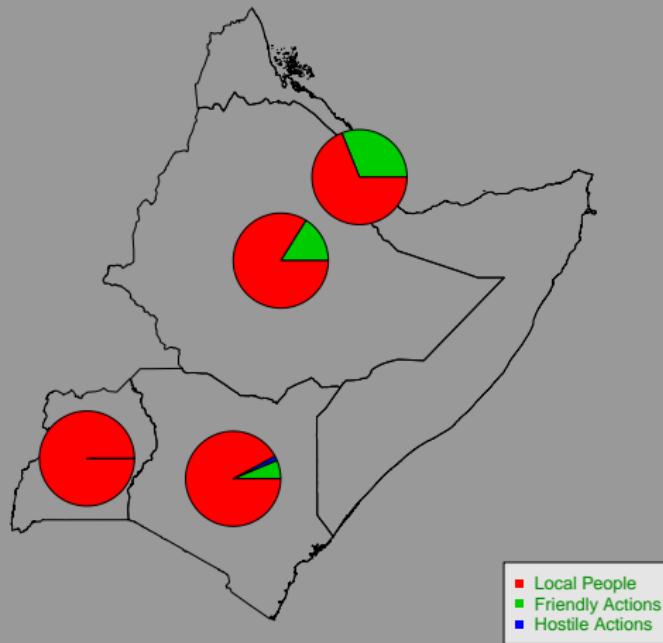
Categorical Analysis by Country

Entry TYPE by Country



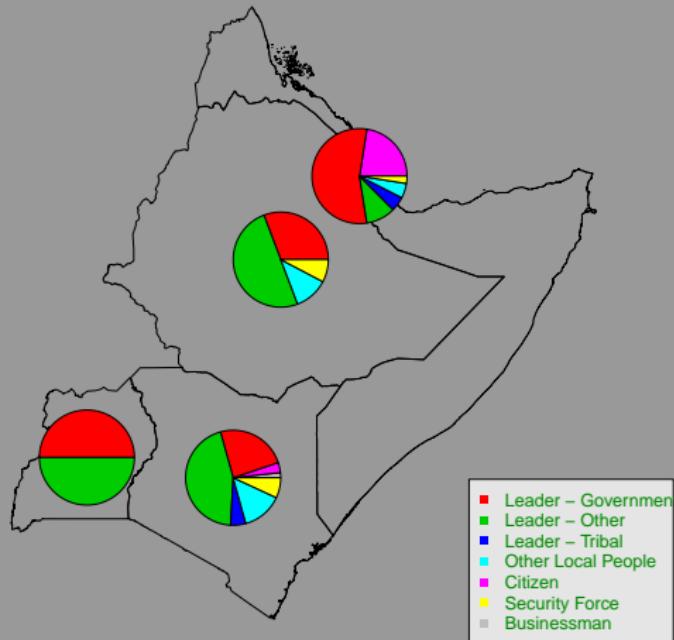
Categorical Analysis by Country

Category of EVENT Data by Country



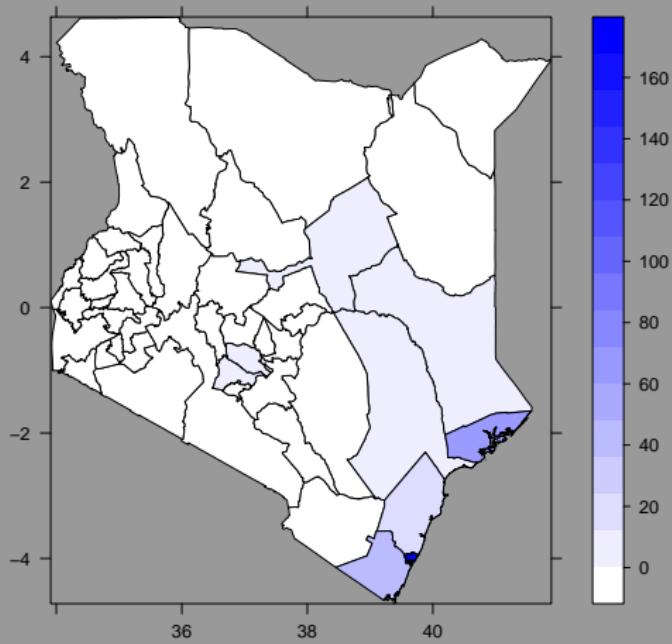
Categorical Analysis by Country

Category of EVENT Data by Country



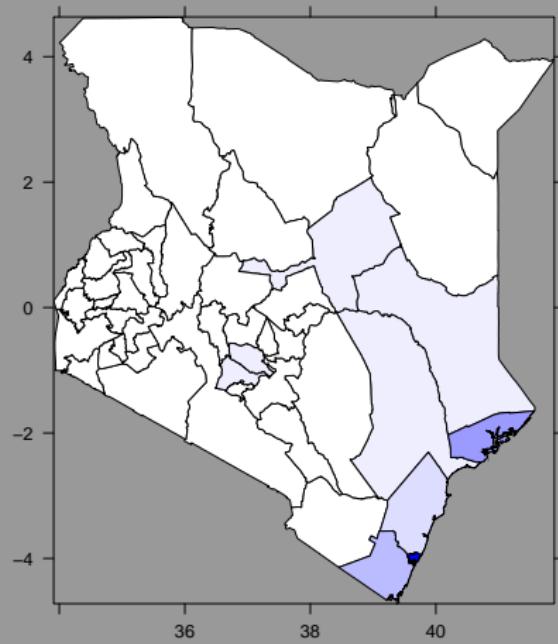
Friendly-Enemy Comparison

TF HOA Data Density, Kenya

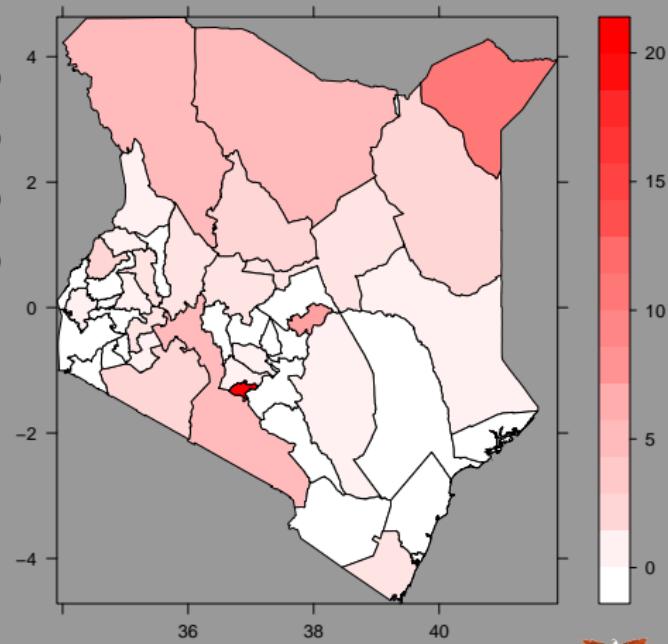


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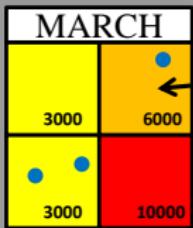
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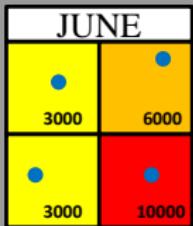
Historical Terrorist Incidents, Kenya



Population Weighting Analysis



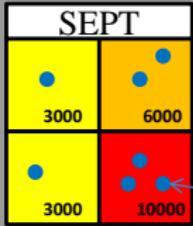
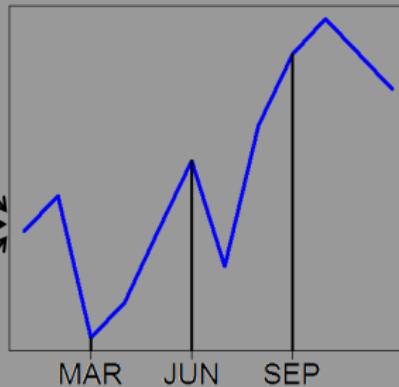
2.5 minute
raster cell with
population of
app. 6000



MEAN

MEAN

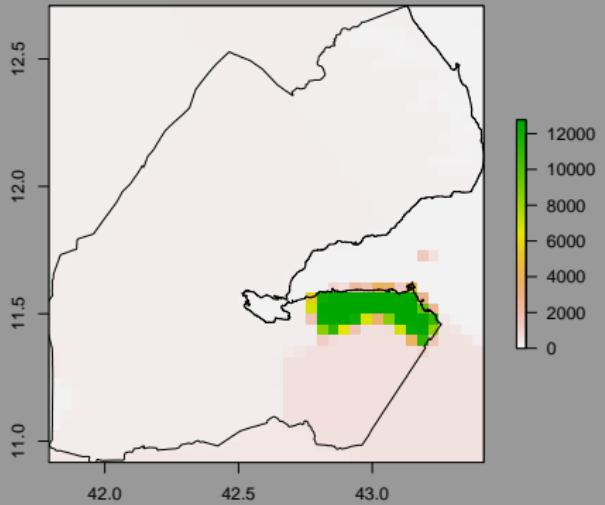
MEAN



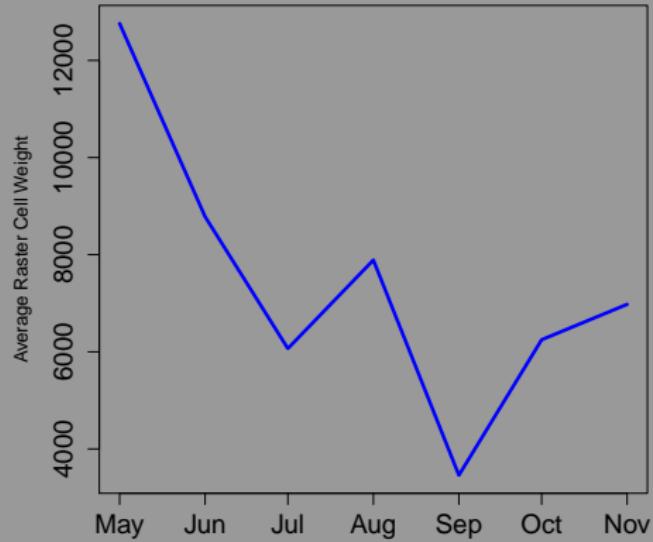
Friendly Patrol Data Points



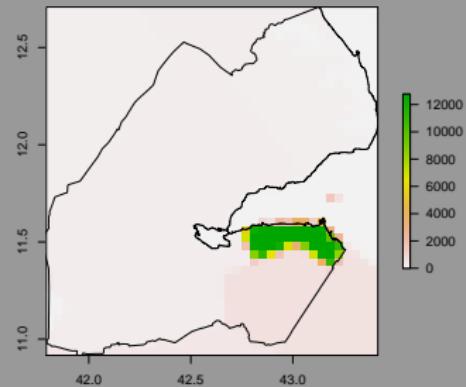
Raster Weighting



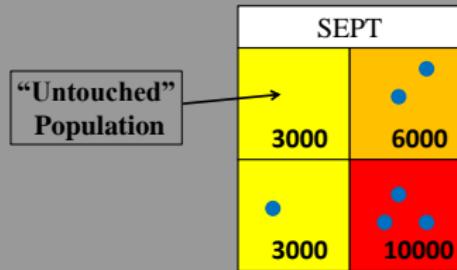
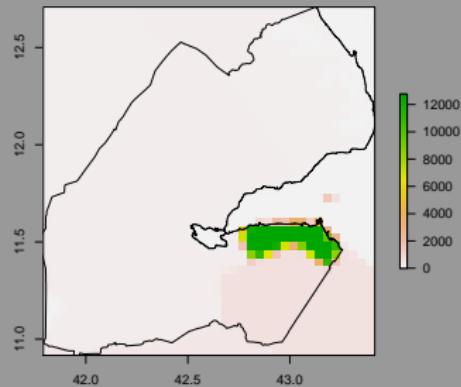
Raster Weighting



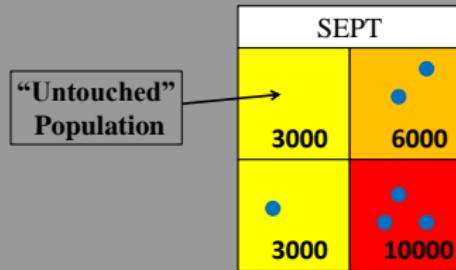
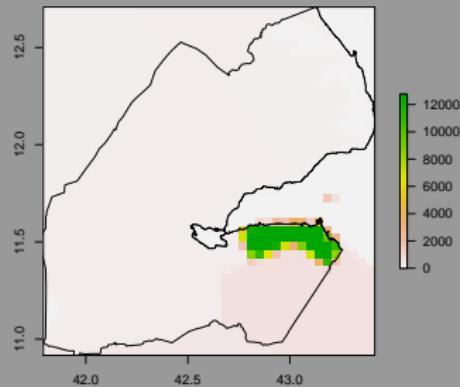
Population Proportion Analysis



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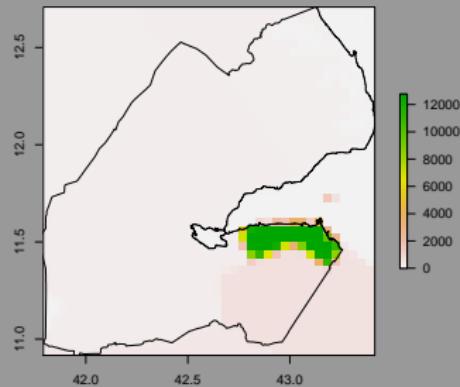
$$\hat{p} = \frac{\sum_{j \in T} w_j}{\sum_{i \in R} w_i}$$

R = All Rasters

T = “Touched” Rasters



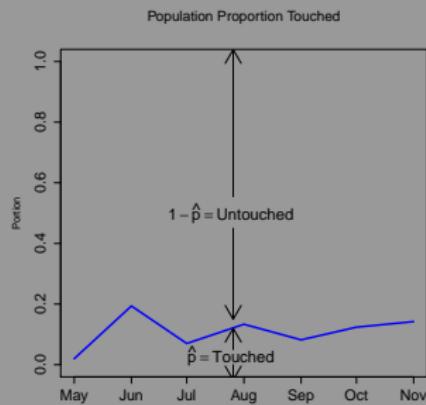
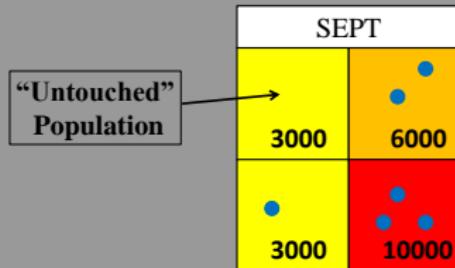
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TIGR Analytical Advantages:

- ① Arguably the most comprehensive database of blue action.
- ② CIDNE events reside in the TIGR database
- ③ Easy to export from anywhere on the battlefield
- ④ Familiar to warfighters

TIGR Analytical Challenges:

- ① Voluntary participation from units.
- ② Lack of uniform standard for data entry in the "Summary Field."
- ③ Export functions do not have category or spatial data for "Reports"
- ④ Duplicate data points (Patrol debrief overlaps with CIDNE)



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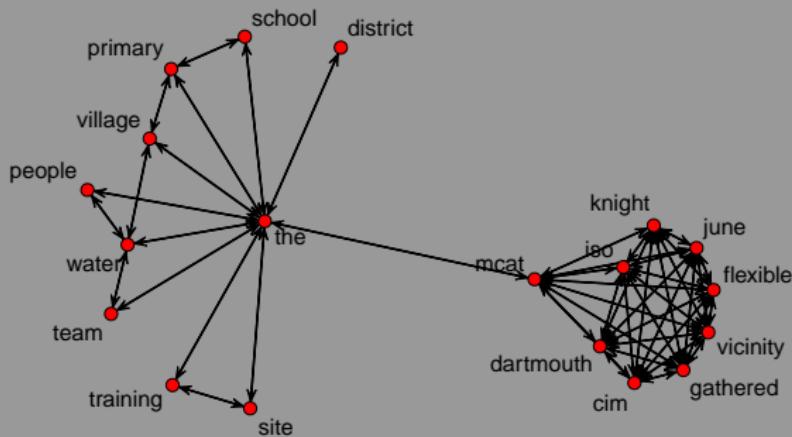
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Current Analysis: Text Mining

TIGR Description Field

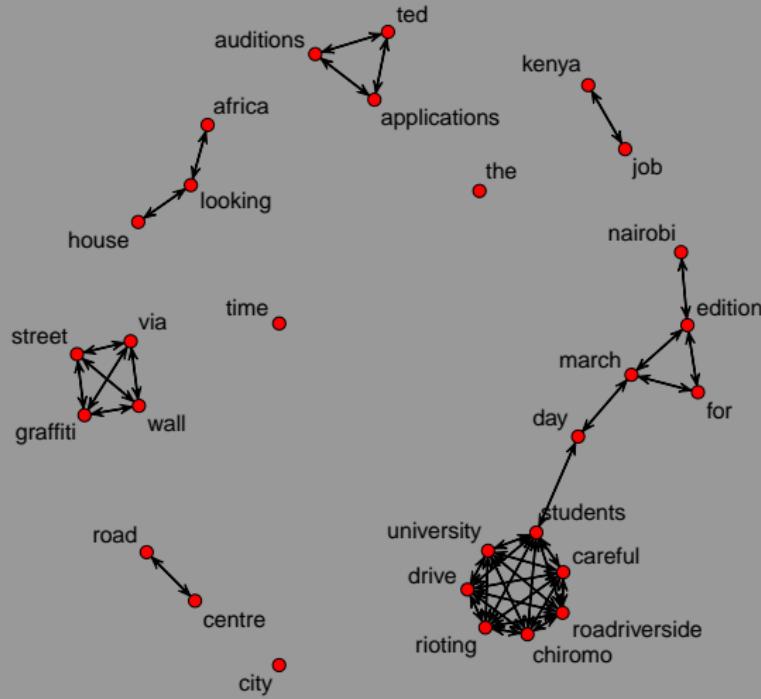
Correlation Greater than 0.3



Current Analysis: Text Mining

Twitter-Kenya

Correlation Greater than 0.1



Questions?



References I

-  Bivand, R. S., Pebesma, E. J., & Gomez-Rubio, V. (2008). *Applied spatial data analysis with R*. New York: Springer Science+Business Media.
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References II

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