Data Analysis of Commodity Prices

BY

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Objective

- Supply demand imbalance, natural calamities etc. may not always be the reason behind the rise in the price of a commodity.

- It may be a consequence of artificial supply deficit planned intelligently by traders' nexus for profiteering through manipulation of supply of commodity and hence indirectly controlling their prices.

- Our attempt is to locate such hikes in prices which seem suspicious (we call them anomalies).

- To detect and analyse the characteristics of anomalies in the prices of commodities, currently only onion

Introduction

- What is Anomaly?
- Reasons for hike in the prices:
  - Supply Shortage
 - Government Policies
  - Hoarding
  - Political impact

Data we have

- Structured Data (mostly 2006 onwards)
  - Daily Wholesale Price (WP) of Onion for 1514 Mandis
  - Daily Arrival of Onion information for 1514 Mandis
  - Daily Retail Price (RP) of Onion for 76 Centres (Major cities in India)
- Unstructured Data
  - Dates and Location for hoarding reports from news articles

Method Used for Data Collection and Usage

- Crawlers were written to fetch the prices (WP [1] & RP [2]) and arrivals from 2006 onwards from government websites

- Use of Voronoi Diagram to map Mandis to Centres

  - Average of WP of all Mandis in its region

  - Sum of Arrivals of all Mandis in its region

Voronoi Diagram
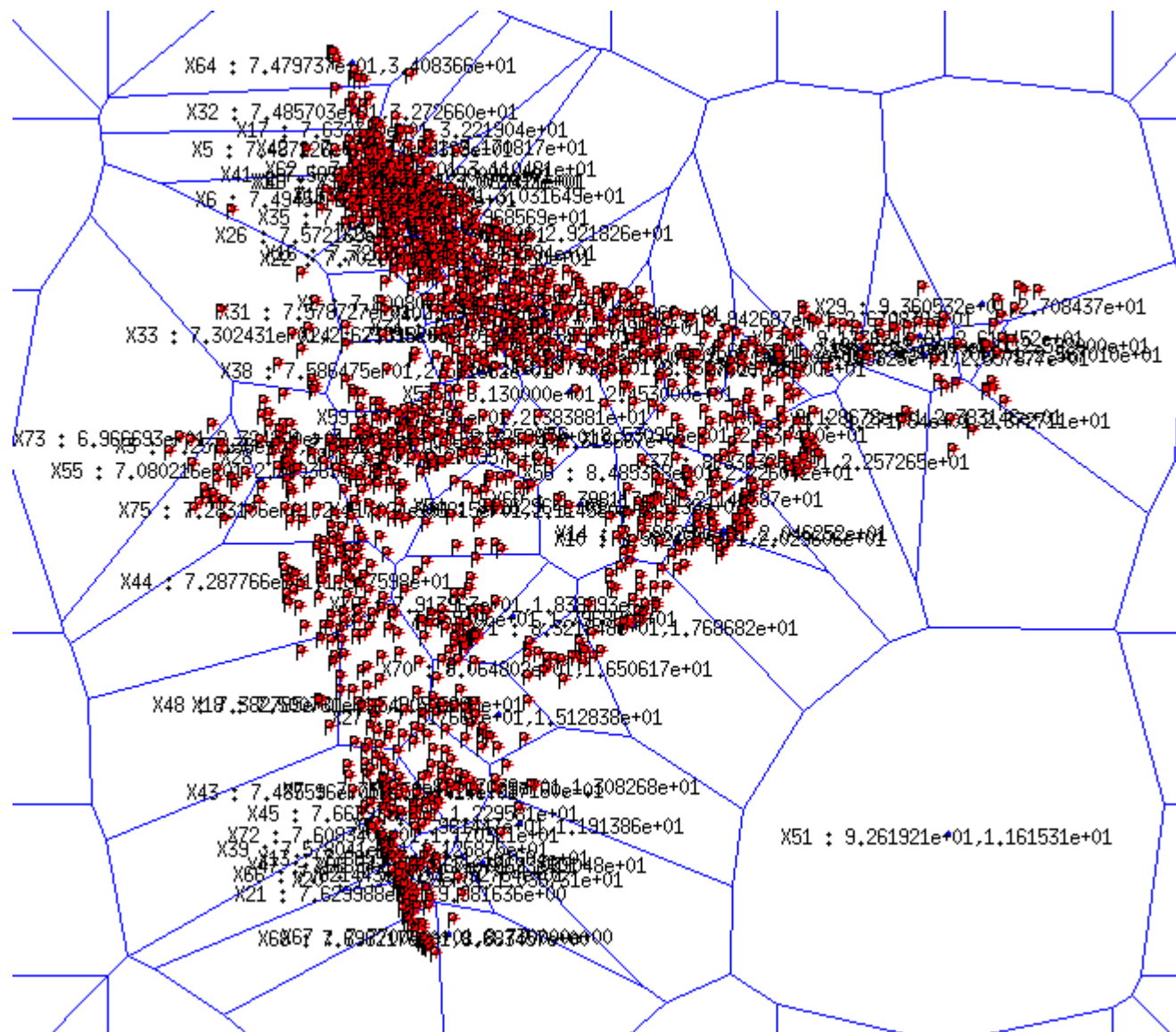
Assumptions

▶ Retail price at centre is dependent on arrival and wholesale price of mandis in the region and has no effect from the other mandis not in region.

▶ Mandis in the region of the centre don't transact within themselves.

▶ While calculating the wholesale price for a centre, distance between centre and mandi was not considered.

▶ Smoothing of data was done over one week, for some of the methods

▶ Modal wholesale prices are considered for calculations.

Characteristics of anomaly found from News Articles:

➢ Large Difference between Retail and Wholesale Prices

➢ Comparison of (Wholesale price, Arrivals) this year against last year at the same time period of year

➢ Large Spike in the Retail Prices over duration of 2 weeks

➢ All of the above parameters were calculated for every news article, some of the parameters deviated from the reported values. This may be because retail prices are reported for the lowest quality of commodity.
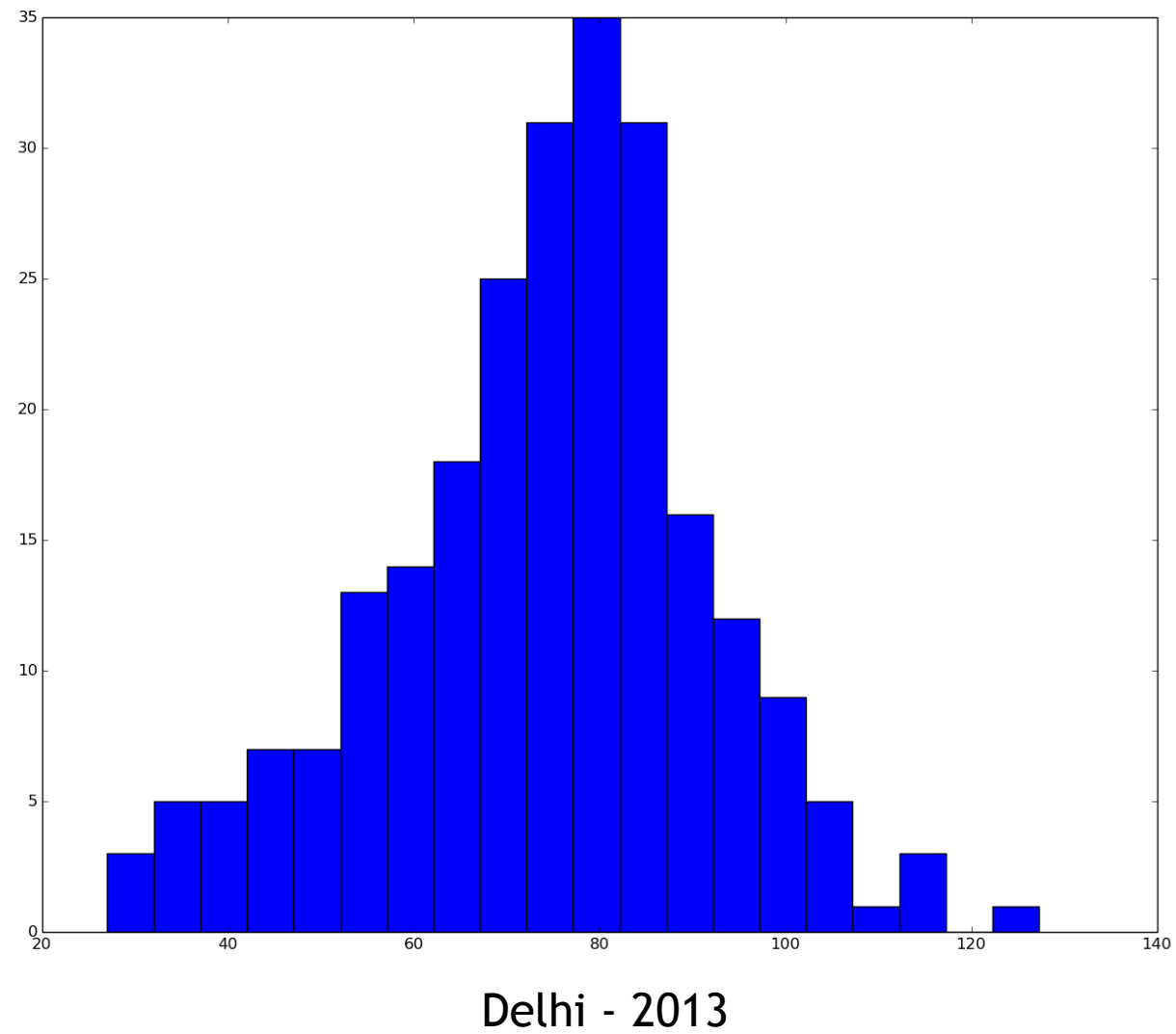
Approach - 1

- Rise in arrival and wholesale price is computed wrt last year

- If wholesale price rises despite increase in arrival, possible anomaly

- Eg. In January 2009, at centre Mumbai, rise in arrival was reported to be 116.26% and rise in wholesale price was reported as 202.64% as compared to January 2008

Approach - 2

- Calculate difference between Retail and wholesale price wrt wholesale price for every centre for everyday yearly.

- Plot PDF/histogram for calculated values over year

- Study type of distribution and its parameters

- Find defaulter values based on distribution of values

Approach - 2

Delhi - 2013

Approach - 3

▶ Prepare series of values taking difference between retail prices over two weeks

▶ Try to find the spike in this series

▶ Report this period as anomaly
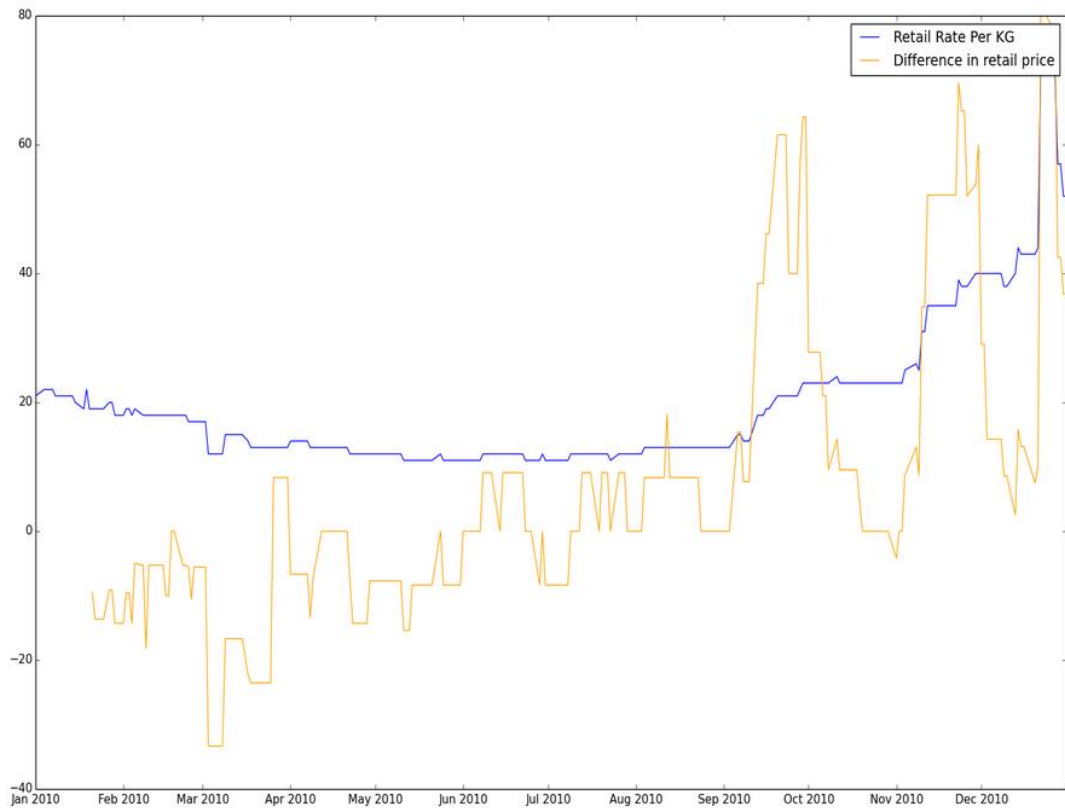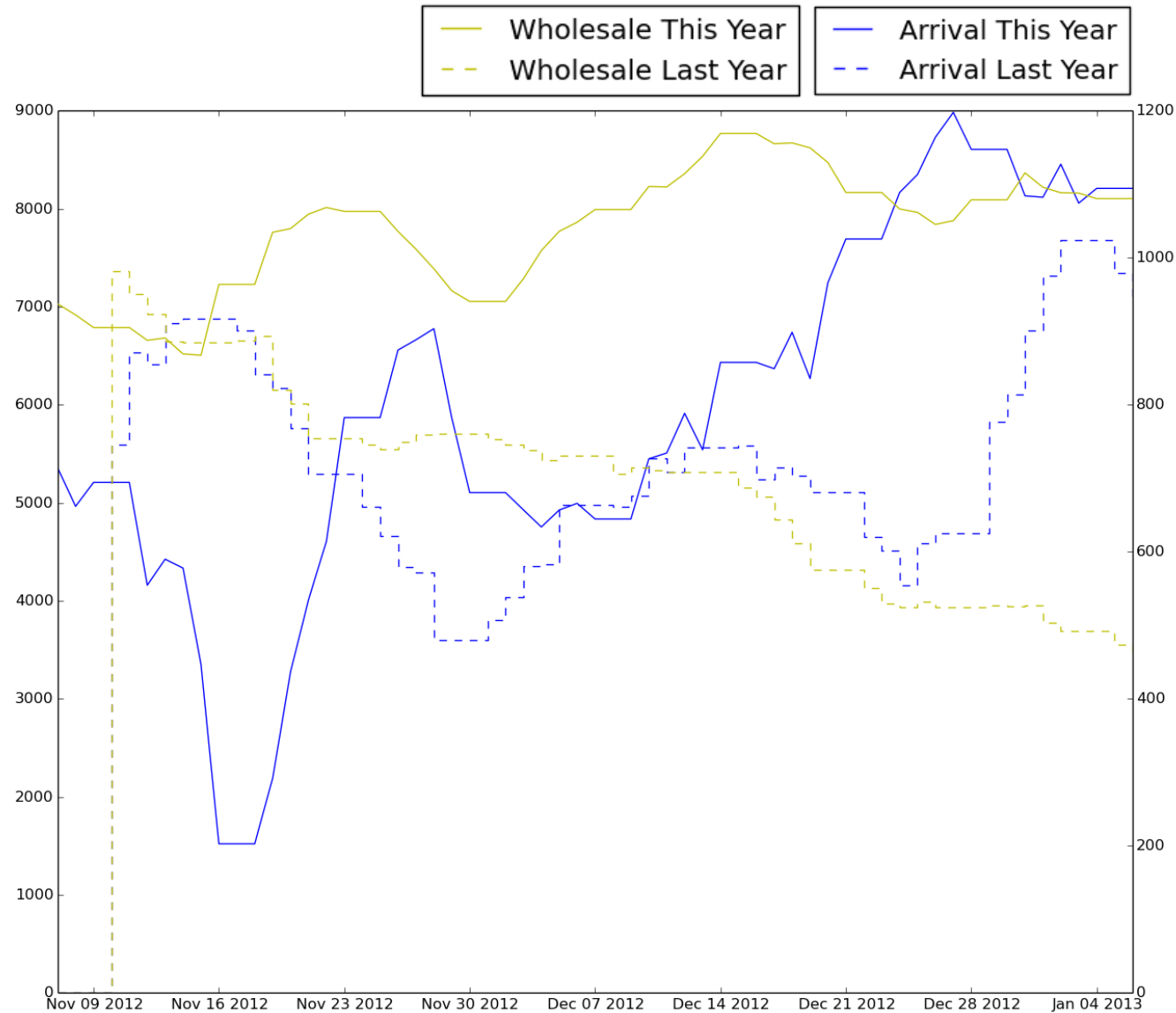

Centre: Mumbai
Year : 2010

Work done till now

- Wholesale Price is inversely proportional to arrivals

- Find the similarity between arrival pattern of this year and last year

- To find similarity we have used lagged correlation with lag value of -15 to +14 days.

- If arrival patterns are found similar, it is expected to have similar pattern for wholesale price

- Locate the cases where wholesale price pattern varied despite having similar arrival patterns

Example 1
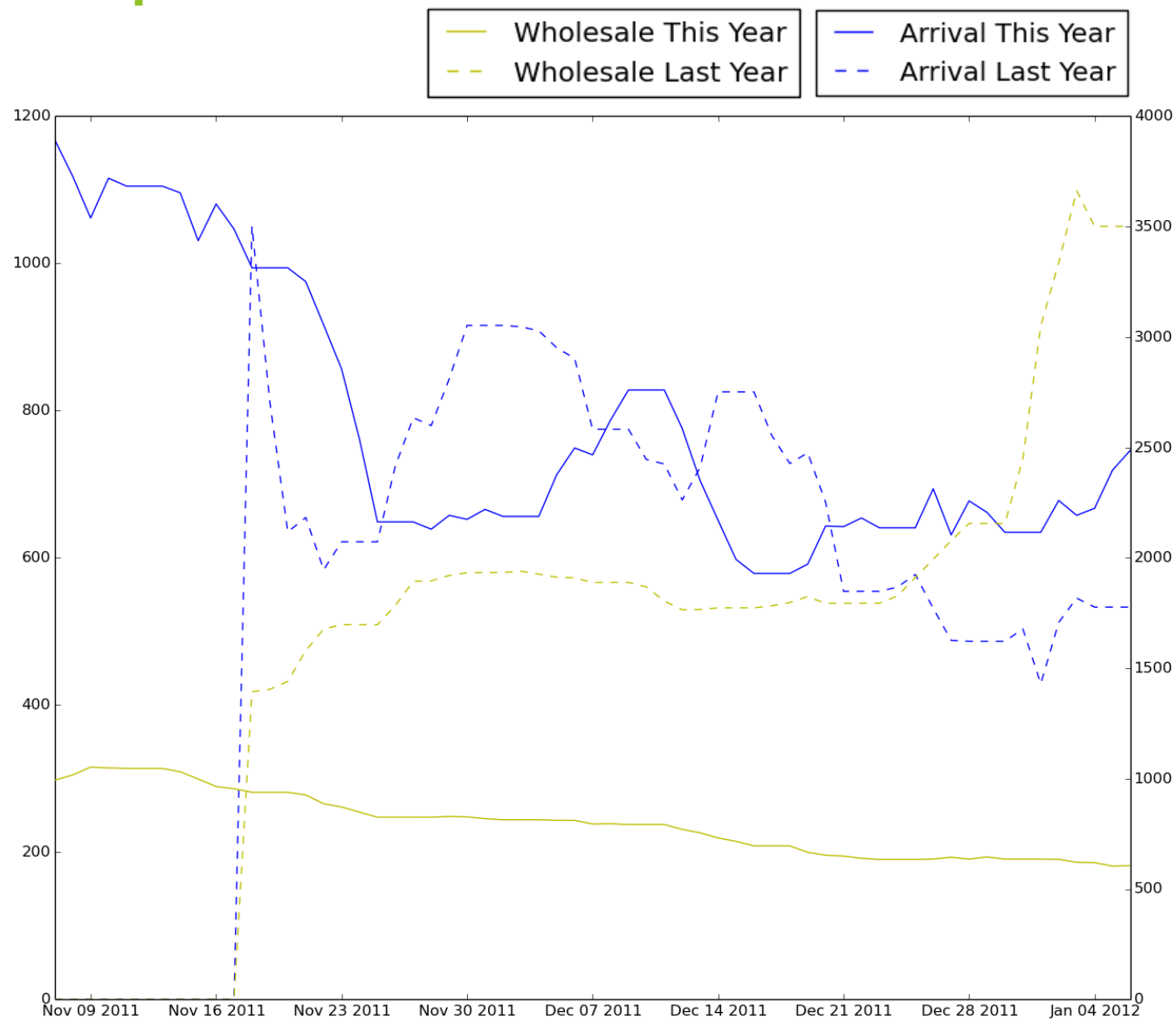
Centre: Ahmedabad
Date: 07-11-2011 to
07-01-2012

Example 2

Centre: Mumbai
Date: 07-11-2012 to
07-1-2013

Future Scope

- To detect anti-competitive practices in setting up prices of commodities
- To understand how external factors apart from supply demand like election influence prices of commodity

References

1. http://agmarknet.nic.in/agnew/NationalBEnglish/CommodityWiseDailyReport.aspx?ss=2

2. http://fcainfoweb.nic.in/PMSver2/Reports/Report_Menu_web.aspx

Thank You!!!

Any Questions?