Forecasting and Times Series Analysis with Oracle Business Intelligence

Event: BIWA Summit 2017

Presenter: Dan and Tim Vlamis

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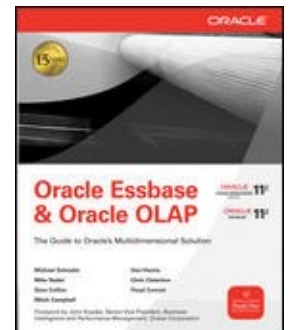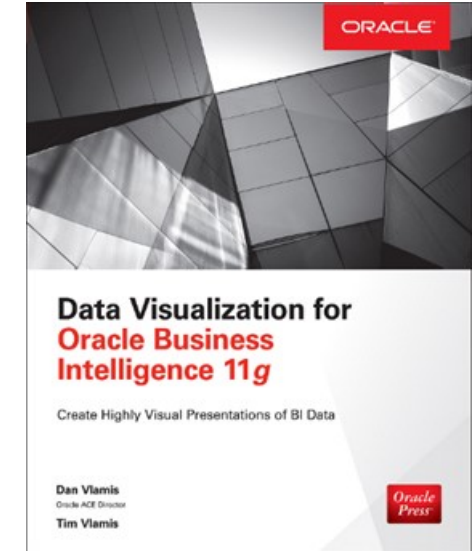
Vlamis Software Solutions

- Vlamis Software founded in 1992 in Kansas City, Missouri
- Developed 200+ Oracle BI and analytics systems
- Specializes in Oracle-based:
  - Enterprise Business Intelligence & Analytics
  - Analytic Warehousing
  - Data Mining and Predictive Analytics
  - Data Visualization
- Multiple Oracle ACEs, consultants average 15+ years
- www.vlamis.com (blog, papers, newsletters, services)
- Co-authors of book "Data Visualization for OBI 11g"
- Co-author of book "Oracle Essbase & Oracle OLAP"
- Oracle University Partner
- Oracle Gold Partner

Dan Vlamis and Tim Vlamis

Dan Vlamis – President
- Founded Vlamis Software Solutions in 1992
- 30+ years in business intelligence, dimensional modeling
- Oracle ACE Director
- Developer for IRI (expert in Oracle OLAP and related)
- BIWA Board Member since 2008
- BA Computer Science Brown University

Tim Vlamis – Vice President & Analytics Strategist
- 30+ years in business modeling and valuation, forecasting, and scenario analyses
- Oracle ACE
- Instructor for Oracle University's Data Mining Techniques and Oracle R Enterprise Essentials Courses
- Professional Certified Marketer (PCM) from AMA
- MBA Kellogg School of Management (Northwestern University)
- BA Economics Yale University

Forecasting Today…

- Predictions are the holy grail of BI systems and initiatives.
- Most all corporations have need for forecasting.
- Typical forecasting systems
  - Are stand alone or from ERP (not integrated to BI system)
  - Tend to use straight line or heuristic calculations
  - Are not always integrated into the business
  - Are often tied directly to the budgeting process
- High level of angst surrounding forecasts

Forecasting Should…

- Be integrated with rest of BI system.
- Be another series of measures that are revealed in the context of historic information.
- Be a part of the Common Enterprise Model.
- Have visibility across functional areas and roles in corporations.
- Be adjusted based on an integrated view across corporate functions (marketing, operations, finance, etc.).

Forecasts Should be Based on Evidence
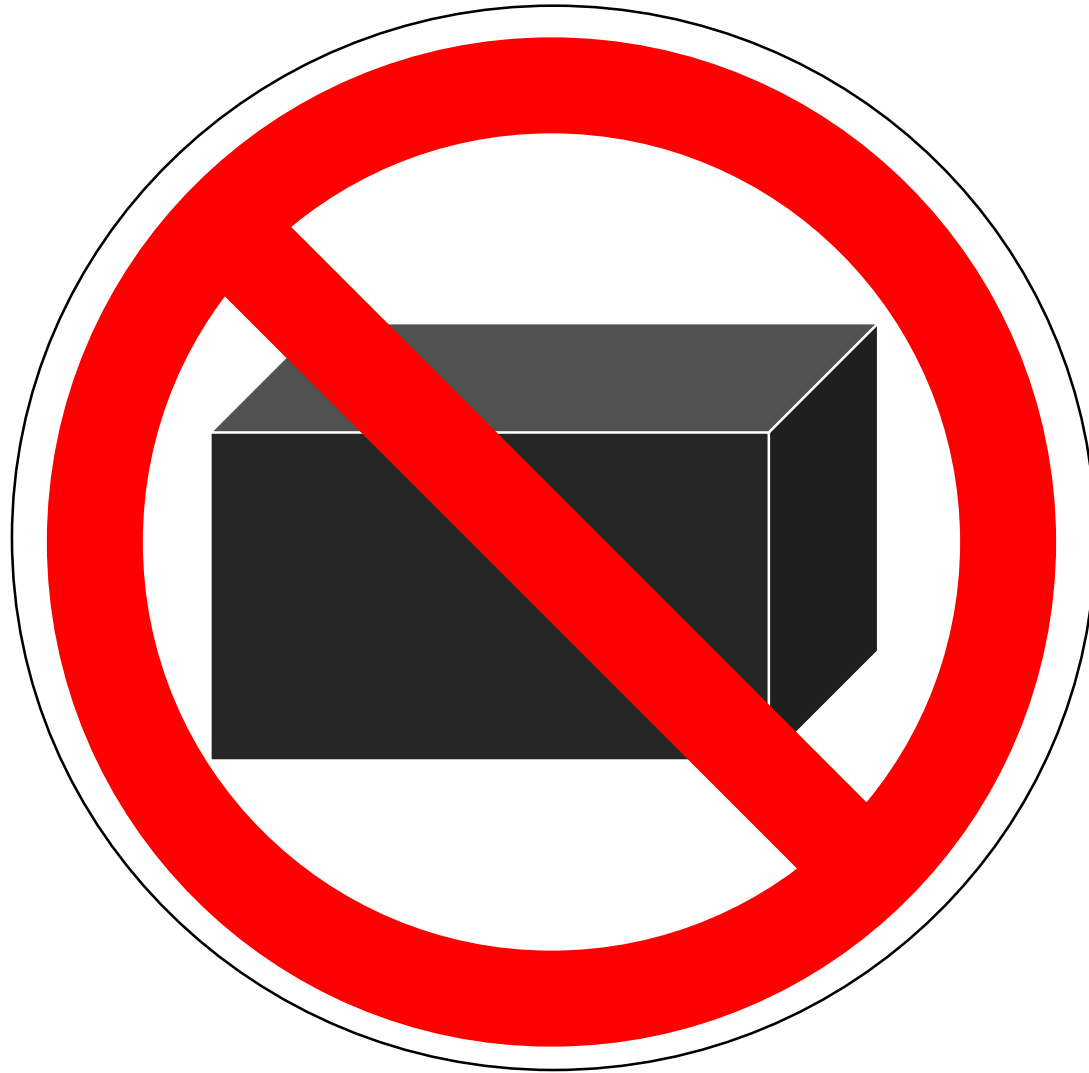
Forecasting Methodologies

- Rule-based heuristic (last period, last period +5%, etc.)
- Cross-sectional methodologies (point in time)
- Time series (time sequenced data series)
- Mixed models
- Averages (moving, weighted, etc.)
- Linear and Non-linear regressions (line fitting)
- Transforms, projections, min/max

Methodologies for Today

- Forecast Function in OBI and DVD
  - ETS (Triple Exponential Smoothing – Error Trend Seasonal)
  - ARIMA (Auto Regressive Integrated Moving Average)
- Oracle R Distribution OBIEEAdvancedAnalytics Package

- Methods we likely won't have time for
  - Other OBI Time Series Functions
   - (AGO,TODATE, PERIODROLLING)

Exponential Smoothing

- Methodology for smoothing data and preferencing more recent periods when doing time series forecasts
- Similar conceptually to a weighted moving average
- Weights decline according to an exponential function. $\{1, (1-\alpha), (1-\alpha)^2, (1-\alpha)^3, \ldots\}$
- Higher values give more weight to more recent periods

- Single (weighted average of most recent observation and the most recent smoothed statistic)
- Double (trend either up or down)
- Triple (period effect)
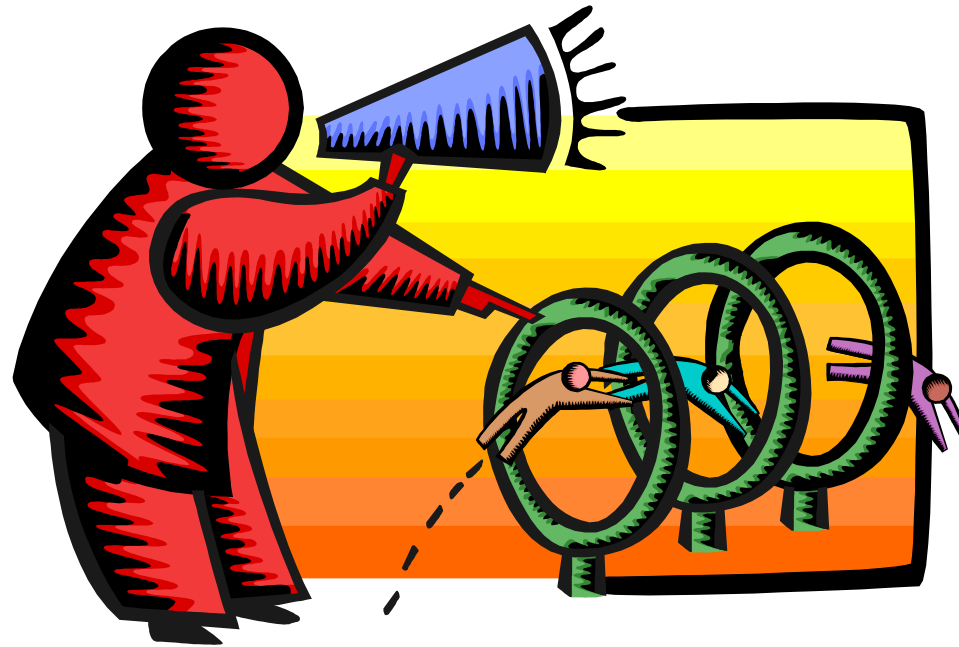
ETS Exponential Smoothing

- Default for forecast()
- Can choose from Additive or Multiplicative Methods
  - For example series of (5, 10, 15):
  - Additive methods use discrete differences
    - growth is constant +5 units
  - Multiplicative method uses percentage or marginal differences
    - growth is a decreasing percentage
- Use Box-Cox transform? (lambda=0 is a log transform)
  - Transforms data to achieve a more normal distribution
- Use Trend Dampening? (past results are as important as recent)
- Output forecast or upper/lower bounds?
- Set Prediction Interval (0-100)

ARIMA Model

- **A**uto**R**egressive **I**ntegrated **M**oving **A**verage
- Powerful algorithm for series analysis and prediction
- Three parameters (p, d, q)
  - Auto regression (how reliant series values are on previous series values). AR(0) is white noise.
  - Integrated (degree of AR differencing, Random Walk)
  - Moving average (smoothing function)
- Set Prediction Interval (0-100)
- Choose AIC method
- Output forecast or upper/lower bounds
- Know the name Rob Hyndman for ARIMA in R

https://www.otexts.org/fpp/

ARIMA Model

- Set Prediction Interval (0-100)
- Choose Information Criterion method AIC or BIC (use auto)
  - Helps you determine which models have the lowest error
- Output forecast or upper/lower bounds

Advice

- Make sure that you have date type fields
- Make sure data is clean and consistent
- Be careful of months (days and weeks often work better)
- Negative values can throw off some models
- Outliers can have very large effects
- Don't set Prediction Interval too high

Oracle Data Visualization has Examples

- http://www.oracle.com/technetwork/middleware/bi-foundation/data-visualization-2954126.html
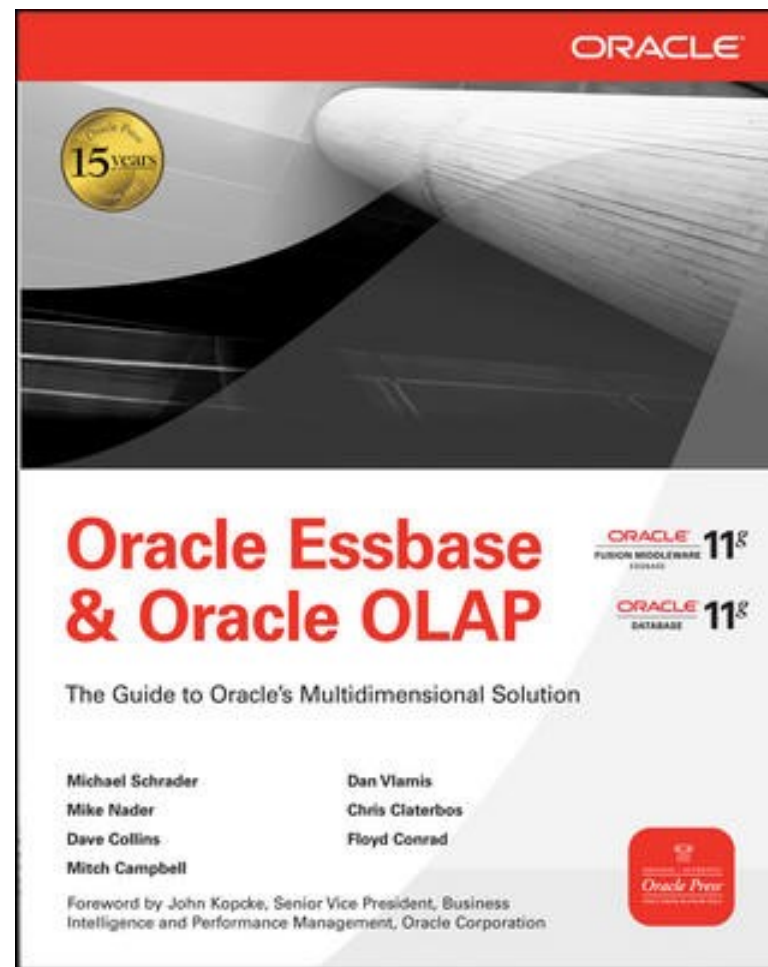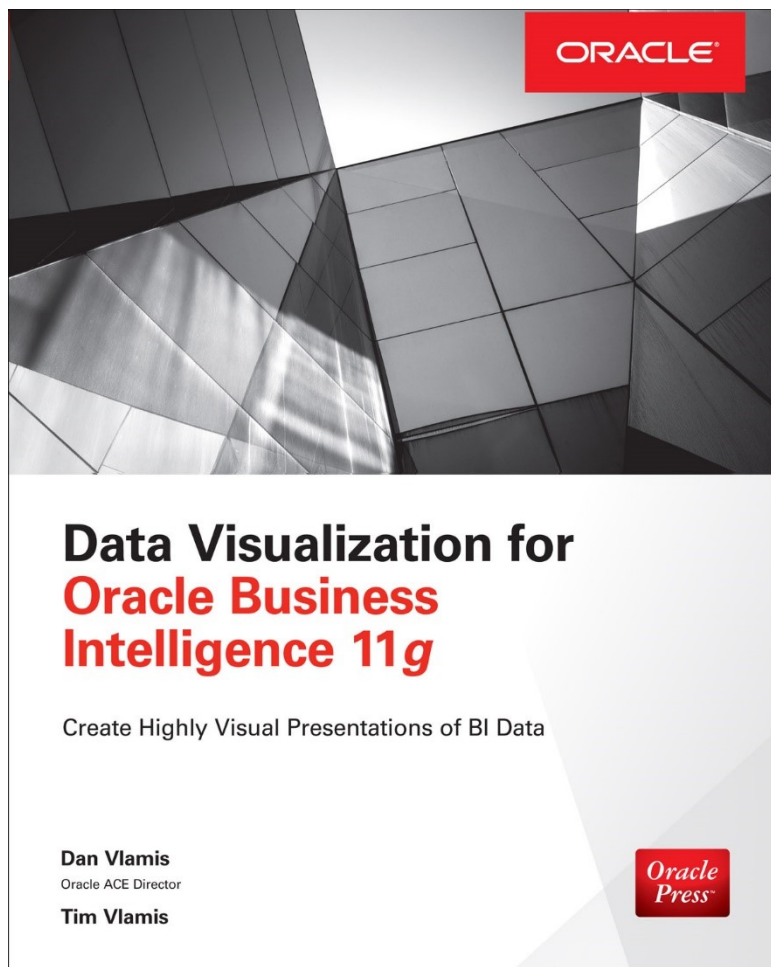

Forecast Syntax Examples
Leveraging various options in the Forecast function

⬇ Download Examples [Video]

Oracle Press Books

Data Visualization for Oracle Business Intelligence 11g
Create Highly Visual Presentations of BI Data
Dan Vlamis
Oracle ACE Director
Tim Vlamis

Oracle Essbase & Oracle OLAP
The Guide to Oracle's Multidimensional Solution
Michael Schrader   Dan Vlamis
Mike Nader   Chris Claterbos
Dave Collins   Floyd Conrad
Mitch Campbell
Foreword by John Kopcke, Senior Vice President, Business Intelligence and Performance Management, Oracle Corporation

Questions?

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