

Technical White Paper

IntelliReal Valuation Methodologies

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Introduction

IntelliReal currently utilizes four separate proprietary valuation methodologies to produce independent valuations with associated confidence scores; Corrected Trend Model (CTM), KARL, Corrected Assessor Model (CAM) and the Expert System (ES). Based upon the confidence score of each individual model, IntelliReal applies another proprietary methodology called Perfect Value (PV) that selects the best valuation or produces a composite valuation. In addition, IntelliReal utilizes comprehensive statistics that deliver statistically-grounded valuation ranges at user-defined confidence levels. What follows is a general description of each process and how it functions.

The Segmentation Process

In order to understand how the valuation methodologies work, it is important to understand the concept of segmentation and how segments enable the various valuation and confidence methodologies. Segmentation (sometimes referred to as “clustering”) is based upon sales volume, property type and geography.

The first step in segmentation is to identify arms length transactions for each property type for the entire database of 76 million records. Since location is very important in residential real estate valuations, the process starts with a geographical component. IntelliReal has defined a set of micro geographical base units about which there is a rich set of location, economic, social, house attribute and demographic data. These geographical base units are comprehensive in the sense that they cover the entire geography of the United States without overlap. These units also nest completely within county boundaries. Each property is accurately placed into a unique geographical base unit. This technique requires sophisticated geo-coding technology perfected by IntelliReal.

The critical elements of creating segments for each property type include: a sufficient number of arms length transactions to create a robust model, knowledge of the geographical location of the sample set, and known attributes of the geographical base units. Creating segments for each property type now becomes a matter of assembling the optimal number of similar base units within a limited geography to satisfy the minimum number of transaction examples required to fully represent the patterns in the data. Using its proprietary methodologies, IntelliReal has clustered approximately 185,000 unique and independent segments within the U.S.

Real estate values are dynamic and temporally distributed, and it is necessary to time shift property values over relatively short time-periods. This requires a trend line for each segment which becomes the basis of the Intelligent Market Volatility Index (iMVI). This base trend line is generated for each segment by computing the median values of arms length transactions over time.

The Four Valuation Methodologies

- CTM is a valuation methodology based upon a proprietary house price index trend (iMVI). Valuation by CTM is simply the time shifting of the last arms length sale along the price index trend line preserving the property’s relationship with the trend line at the time of the last sale and the trend line on the valuation date. The confidence score of a CTM valuation is based upon the performance of a holdout sample of records for each segment against reference values for the sample.
- KARL is a multivariate piecewise non-linear regression pattern recognition engine that produces a scoring equation for each segment. KARL valuations are calculated from the scoring equation using property and location attributes as variables. A KARL valuation is valid only for the date it was produced. These valuations are time-shifted to the desired date using the CTM time-shifting methodologies.

The confidence score of a KARL valuation is generated for the segment in which the property falls by comparing a set of KARL valuations against a set of known transaction values of properties that are randomly selected and withheld from the pattern recognition process. The mean and standard deviation of the resulting distribution of errors are statistically combined to produce a single confidence score based upon the statistical probability of a valuation falling within +/-10% of its actual transfer value on the date of sale for the property's assigned segment.

- CAM is an assessor-based valuation process using ratio analysis to correct assessor valuations. CAM valuations are only valid on a single date, and are time-shifted to the desired date using CTM. The confidence score of a CAM valuation is created in the same manner using the same holdout sample as KARL valuations.
- ES valuations are generated using appraiser emulation technology combined with hedonic elements that are used for adjusting the values of comparable properties based upon attribute differences. The confidence score of an ES valuation is based upon the similarity among the selected comparables, their distance from the subject property, and approximately 100 unique attribute considerations.

The Perfect Value (PV) Routine

Benchmark tests have demonstrated that in virtually every case, using one or more of the IntelliReal valuation methodologies will produce a value within an acceptable margin of error. The methodology used differs from property to property even within the same segment — necessitating a method of identifying the most likely “perfect” value.

Each valuation methodology produces a confidence score for final selection. This selection methodology is called PV. PV is rules-based and considers the confidence of each valuation, selects one or more of the valuations and, if necessary, calculates a new composite valuation. PV creates its own confidence score based upon the actions taken to produce the score. PV substantially increases accuracy of the delivered valuation and is preferred over the use of any one valuation methodology.

Valuation Statistics

In addition to the confidence scores described for each model (which are primarily used as component inputs to PV), IntelliReal produces a suite of confidence and risk measures for each unique valuation. Among these are the Mean Percent Error (MPE), the Expected Standard Deviation (ESD), and the Maximum Inherent Financial Risk (IFR).

- MPE is the arithmetic mean (average) of the percent errors in valuation from the holdout sample for each segment.
- ESD is the percent error at one standard deviation within the probability density curve of the errors from the holdout sample in each segment.

An ESD of 12% means that 68% (one standard deviation) of all percent errors fell within a range of +/- 12% of the property value for that segment. Assuming that percent errors are normally distributed the combination of MPE and ESD fully define the distribution of percent errors.

- Since both the MPE and the ESD are subject to sampling errors that can be quantified at a given confidence level, IntelliReal provides a dollar measure called the IFR.

IFR allows the user to select a confidence level and then creates a confidence interval for the mean (MPE) and a confidence for the variance (standard deviation squared, or ESD squared) of the percent error and statistically combines these confidence intervals to deliver a range of valuations that the subject valuation is expected to fall within at the user selected Confidence Level for each valuation.

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