US 20240338714A1

(19) **United States**

(12) **Patent Application Publication**

Rishe et al.

(10) **Pub. No.: US 2024/0338714 A1**

(43) **Pub. Date: Oct. 10, 2024**

(54) **SYSTEMS AND METHODS FOR EVALUATING HISTORICAL REAL ESTATE PRICE TRENDS**

(71) Applicants: **Naphtali David Rishe**, Miami, FL (US); **Malek Adjouadi**, Miami, FL (US)

(72) Inventors: **Naphtali David Rishe**, Miami, FL (US); **Malek Adjouadi**, Miami, FL (US)

(73) Assignee: **The Florida International University Board of Trustees**, Miami, FL (US)

(21) Appl. No.: **18/296,568**

(22) Filed: **Apr. 6, 2023**

Publication Classification

(51) **Int. Cl.**

G06Q 30/0202 (2006.01)

G06Q 50/16 (2006.01)

(52) **U.S. Cl.**

CPC ***G06Q 30/0202*** (2013.01); ***G06Q 50/163*** (2013.01)

(57) **ABSTRACT**

Systems and methods for evaluating historical trends in real estate prices are provided. Systems and methods provide an understanding of historical price trends and assist in a property evaluation or appraisal, as well as allowing for an analysis of comparables in estimating a reasonable offer for a property on the market. Given a timespan of interest, a locale, and a category of properties of interest, an objective historical trend in values can be computed by first evaluating the ratios between the realized prices of transactions and objective governmental assessment of the properties at some fixed point of time. Then, for each period the ratios of all transactions in that period can be averaged, followed by comparing said averages between different time periods.

Folio[1]	Use[2]	Just Value[3]	County-assessed value[4]	Land-value ($Land)[5]	Land area (sq ft)[6]	Year improved[7]	Sq.ft (sq ft)[8]	Owner[9]	Legal[10]	Parcel address[11]	Parcel city[12]
0232270040180	Residential--Multi-family (3)	1.59M	1.59M	1.06M	7080	2000	5479	T&T GLOBAL INVEST LLC	FAIRGREEN RESUB BLKS C-D-E	2843 SHERIDAN AVE	Miami Beach
0232270040170	Residential--Multi-family (3)	2.06M	1.39M	1.06M	7080	1940	7445	STEVEN STARR	FAIRGREEN RESUB BLKS C-D-E	2851 SHERIDAN AVE	Miami Beach
0232270040190	Residential--Multi-family (8)	1.49M	1.49M	1.28M	8538	1961	5918	TUDAN LLC	FAIRGREEN R- S PB 4-154	2825 SHERIDAN AVE	Miami Beach
0232270040160	Residential--Multi-family (8)	1.38M	1.17M	1.06M	7080	1930	6004	SKYRISE Inc	27-53 42 PB 4-154	2901 SHERIDAN AVE	Miami Beach
0232270050040	Residential--Single-family (1)	455K	266K	327K	2178	1975	1720	AMY L RABIN	SALIDOR COURT RE-SUB PB 35-20	331 W 28 ST	Miami Beach
0232270040220	Residential--Multi-family (8)	1.45M	1.36M	1.29M	8580	1935	5225	2822 PINE TREE DRIVE LLC	FAIRGREEN R- S BLKS C-D-E PB 4	2822 PINE TREE DR	Miami Beach
0232270040230	Residential--Multi-family (8)	1.29M	1.04M	1.29M	8580	1950	4832	PHOENECIA REAL ESTATE INVEST L	FAIRGREEN RESUB BLK C-D-E	2830 PINE TREE DR	Miami Beach

Folio[1]	Use[2]	Just Value[3]	County-as-sessed value[4]	Land-value ($Land)[5]	Land area (sq ft)[6]	Year improved[7]	Sq.ft (sq ft)[8]	Owner[9]	Legal[10]	Parcel address[11]	Parcel city[12]
0232270040180	Residential--Multi-family (3)	1.59M	1.59M	1.06M	7080	2000	5479	T&T GLOBAL INVEST LLC	FAIRGREEN RESUB BLKS C-D-E	2843 SHERIDAN AVE	Miami Beach
0232270040170	Residential--Multi-family (3)	2.06M	1.39M	1.06M	7080	1940	7445	STEVEN STARR	FAIRGREEN RESUB BLKS C-D-E	2851 SHERIDAN AVE	Miami Beach
0232270040190	Residential--Multi-family (8)	1.49M	1.49M	1.28M	8538	1961	5918	TUDAN LLC	FAIRGREEN R- S PB 4-154	2825 SHERIDAN AVE	Miami Beach
0232270040160	Residential--Multi-family (8)	1.38M	1.17M	1.06M	7080	1930	6004	SKYRISE Inc	27-53 42 PB 4-154	2901 SHERIDAN AVE	Miami Beach
0232270050040	Residential--Single-family (1)	455K	266K	327K	2178	1975	1720	AMY L RABIN	SALIDOR COURT RE-SUB PB 35-20	331 W 28 ST	Miami Beach
0232270040220	Residential--Multi-family (8)	1.45M	1.36M	1.29M	8580	1935	5225	2822 PINE TREE DRIVE LLC	FAIRGREEN R- S BLKS C-D-E PB 4	2822 PINE TREE DR	Miami Beach
0232270040230	Residential--Multi-family (8)	1.29M	1.04M	1.29M	8580	1950	4832	PHOENECIA REAL ESTATE INVEST L	FAIRGREEN RESUB BLK C-D-E	2830 PINE TREE DR	Miami Beach

FIG.1

Just Value: Market Value per County Appraiser, total of land and building. What the County Appraiser calls, but is typically less than, the most probable price in cash, terms equivalent to cash, or other precisely revealed terms, for which the appraised property will sell in competitive market under all conditions requisite to fair sale as of January 1 of the Roll Year. AKA Just Value (US $)

Land-value: The portion of the just value attributed to the land only, as determined by the County Property Appraiser. Most counties do not have a model to correctly divide the total value between Land and Building ($Land)

County-assessed value: Assessed value for taxation other than by school districts. For 2008, school and non-school assessed value will differ in counties where the county or the city has adopted ordinances for assessing historic property used for commercial or non-profit purposes and high-water recharge property based on character or use. Beginning in 2009, the 10% assessment increase limitation on non-homestead property will also apply only for non-school purposes and further cause the assessed values for school and non-school purposes to be different (US$)

Homestead assessed value per School District: The assessed value of only the portion of the property that is considered a homestead, for school district taxation. The difference between homestead just value and homestead assessed value is that the latter is net of the Save Our Homes assessment increase limitation. Blank for non-homesteaded properties (US$)

School Taxable Value: The taxable value for school district taxation. School taxable value is based only on school assessed value and does not include subtractions for the new additional homestead exemption or local option exemptions which are applicable only to the county or municipality adopting the exemption (US$)

Taxable value, Not for School district: The taxable value for general county and municipal taxation. County taxable value is the county assessed value minus all exemption (US $)

AV-RNR: Residential and non-residential property assessed value. The assessed value of only the portion of the property that is residential or non-residential property under s. 193.155, F.S (US$)

Building Value: The portion of the just value attributed to the improvements of the property, just value of new construction. Note: most counties do not have a model to correctly split value into land and building, so this data item might not be reliable (US$)

FIG. 2

Gross Sq.Ft. (Sq Ft)[4]	City[5]	Address[6]	List Price[7]	Property type[8]	View[9]	Year built[10]	Status of the listing[11]	Closing Date[12]	Sold Price[13]	$ / SqFt as sold[14]	Interior size (sqft)[15]	Sold ÷ Assessed[16]
1110	Miami Beach	2850 Pine Tree Dr #8	320K	Residential	Other View	1951	Closed	2016-07-01	293K	264	1110	1.09
1088	Miami Beach	2850 Pine Tree Dr #7	250K	Residential	Garden View	1951	Closed	2018-05-21	248K	227	1088	0.943
1173	Miami Beach	2850 PINE TREE Dr #1	295K	Residential	Other View	1951	Closed	2018-10-18	289	0.246	1173	0.00107
1128	Miami Beach	2858 PINE TREE Dr #5	258K	Residential	Garden View	1966	Closed	2017-05-18	253K	224	1128	0.824
688	Miami Beach	2858 Pine Tree Dr #4	179K	Residential	None	1966	Closed	2021-01-08	160K	233	688	1.25

FIG. 3

33175	Houses	2006-02	6	1.37
33175	Houses	2006-03	14	1.28
33175	Houses	2006-04	19	1.26
33175	Houses	2006-05	23	1.33
33175	Houses	2006-06	10	1.42
33175	Houses	2006-07	15	1.35
33175	Houses	2006-08	16	1.28
33175	Houses	2006-09	18	1.34
33175	Houses	2006-10	19	1.44
33175	Houses	2006-11	19	1.39
33175	Houses	2006-12	11	1.3
33175	Houses	2007-01	10	1.24
33175	Houses	2007-02	10	1.3
33175	Houses	2007-03	12	1.38
33175	Houses	2007-04	7	1.36
33175	Houses	2007-05	20	1.37
33175	Houses	2007-06	8	1.21
33175	Houses	2007-07	18	1.2
33175	Houses	2007-08	12	1.18
33175	Houses	2007-10	10	1.2
33175	Houses	2007-11	6	1.29
33175	Houses	2007-12	11	1.14

FIG. 4

33175	Houses 2006-02 6	1	0% (since 2006-02)
33175	Houses 2006-03 14	0.934	-6.6% (since 2006-02)
33175	Houses 2006-04 19	0.92	-8% (since 2006-02)
33175	Houses 2006-05 23	0.971	-2.9% (since 2006-02)
33175	Houses 2006-06 10	1.04	3.6% (since 2006-02)
33175	Houses 2006-07 15	0.985	-1.5% (since 2006-02)
33175	Houses 2006-08 16	0.934	-6.6% (since 2006-02)
33175	Houses 2006-09 18	0.978	-2.2% (since 2006-02)
33175	Houses 2006-10 19	1.05	5.1% (since 2006-02)
33175	Houses 2006-11 19	1.01	1.5% (since 2006-02)
33175	Houses 2006-12 11	0.949	-5.1% (since 2006-02)
33175	Houses 2007-01 10	0.905	-9.5% (since 2006-02)
33175	Houses 2007-02 10	0.949	-5.1% (since 2006-02)
33175	Houses 2007-03 12	1.01	0.73% (since 2006-02)
33175	Houses 2007-04 7	0.993	-0.73% (since 2006-02)
33175	Houses 2007-05 20	1	0% (since 2006-02)
33175	Houses 2007-06 8	0.883	-12% (since 2006-02)
33175	Houses 2007-07 18	0.876	-12% (since 2006-02)
33175	Houses 2007-08 12	0.861	-14% (since 2006-02)
33175	Houses 2007-10 10	0.876	-12% (since 2006-02)
33175	Houses 2007-11 6	0.942	-5.8% (since 2006-02)
33175	Houses 2007-12 11	0.832	-17% (since 2006-02)

FIG. 5

Zipcode	Property type	Month	Number of closings [1]	Mean of price ÷ 2022-assessed [2]	Median of price ÷ 2022-assessed [3]	Appreciation since 02/2006[4] of the median of price ÷ 2022-assessed [5]	% Appreciation since 02/2006[6] of the median of price ÷ 2022-assessed [7]
33175	Houses	05/2023	3	1.45	1.54	1.6	excluded [10]
33175	Houses	04/2023	13	1.58	1.66	1.72	**72%** (since 02/2006)
33175	Houses	03/2023	16	1.51	1.49	1.55	**55%** (since 02/2006)
33175	Houses	02/2023	8	1.56	1.6	1.66	**66%** (since 02/2006)
33175	Houses	01/2023	4	1.5	1.49	1.55	excluded [11]
33175	Houses	12/2022	18	1.44	1.47	1.52	**52%** (since 02/2006)
33175	Houses	11/2022	19	1.53	1.5	1.56	**56%** (since 02/2006)
33175	Houses	10/2022	23	1.47	1.47	1.52	**52%** (since 02/2006)
33175	Houses	09/2022	18	1.46	1.49	1.55	**55%** (since 02/2006)
33175	Houses	08/2022	24	1.51	1.51	1.57	**57%** (since 02/2006)
33175	Houses	07/2022	10	1.38	1.47	1.52	**52%** (since 02/2006)
33175	Houses	06/2022	17	1.54	1.52	1.58	**58%** (since 02/2006)
33175	Houses	05/2022	26	1.49	1.42	1.47	**47%** (since 02/2006)
33175	Houses	04/2022	22	1.45	1.48	1.54	**54%** (since 02/2006)
33175	Houses	03/2022	26	1.4	1.44	1.49	**49%** (since 02/2006)
33175	Houses	02/2022	26	1.31	1.32	1.37	**37%** (since 02/2006)
33175	Houses	01/2022	17	1.34	1.33	1.38	**38%** (since 02/2006)

FIG. 6

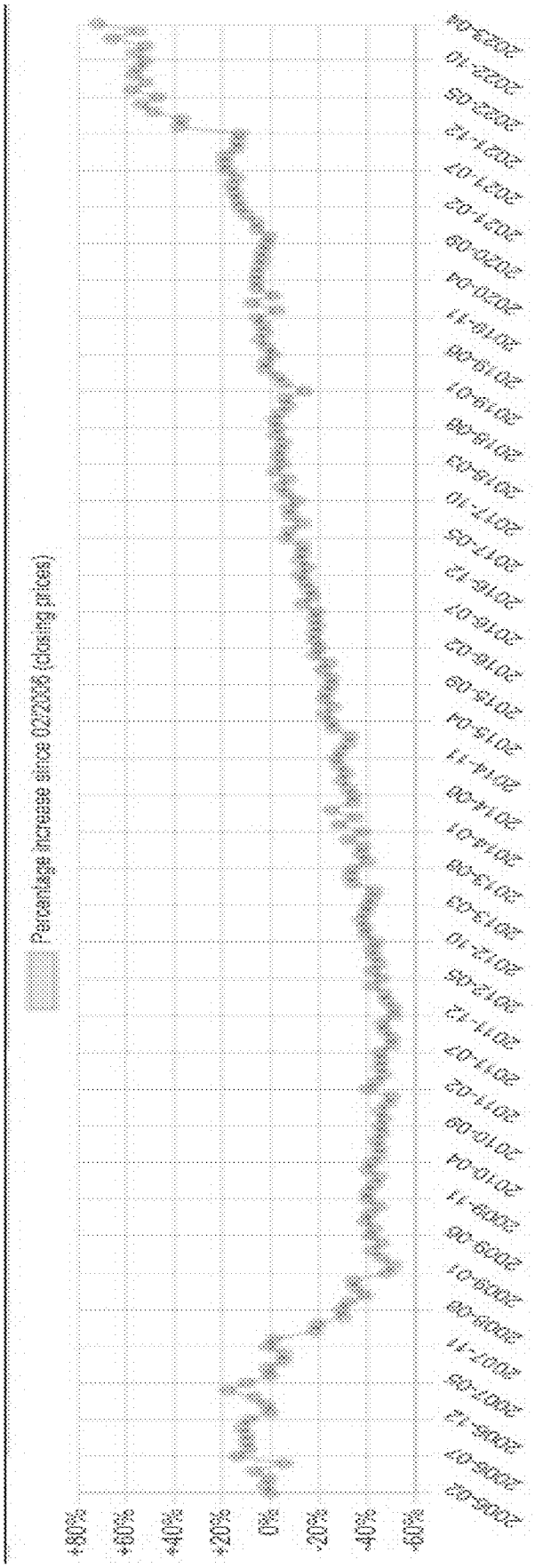
Percentage increase since 002006 (closing price)
+80%
+60%
+40%
+20%
0%
-20%
-40%
-60%
2006-02
2006-07
2006-12
2007-05
2007-10
2008-03
2008-08
2009-01
2009-06
2009-11
2010-04
2010-09
2011-02
2011-07
2011-12
2012-05
2012-10
2013-03
2013-08
2014-01
2014-06
2014-11
2015-04
2015-09
2016-02
2016-07
2016-12
2017-05
2017-10
2018-03
2018-08
2019-01
2019-06
2019-11
2020-04
2020-09
2021-02
2021-07
2021-12
2022-05
2022-10
2023-04

FIG. 7

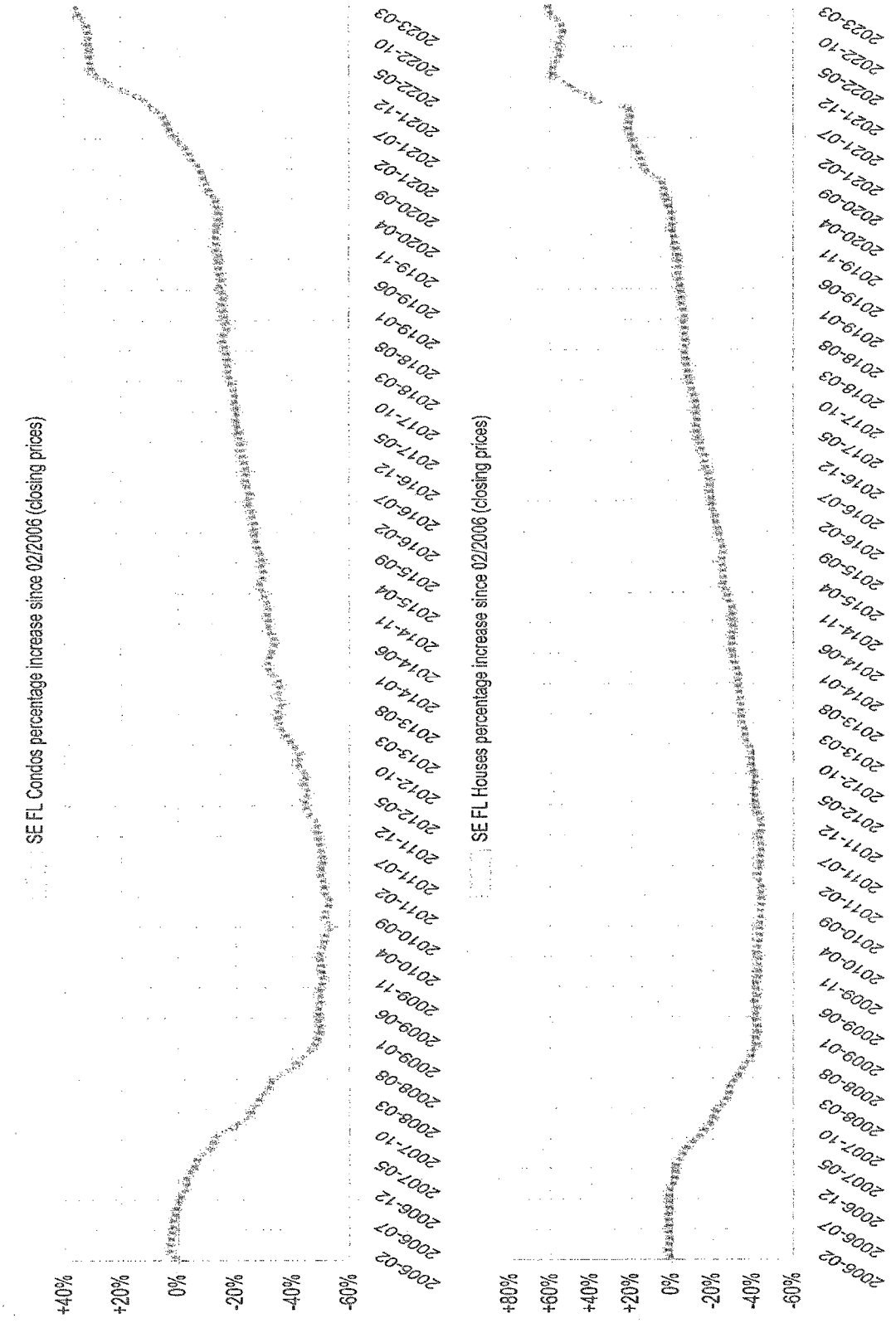
SE FL Condos percentage increase since 02/2006 (closing prices)
+40%
+20%
0%
-20%
-40%
-60%
2006-02
2006-07
2006-12
2007-05
2007-10
2008-03
2008-08
2009-01
2009-06
2009-11
2010-04
2010-09
2011-02
2011-07
2011-12
2012-05
2012-10
2013-03
2013-08
2014-01
2014-06
2014-11
2015-04
2015-09
2016-02
2016-07
2016-12
2017-05
2017-10
2018-03
2018-08
2019-01
2019-06
2019-11
2020-04
2020-09
2021-02
2021-07
2021-12
2022-05
2022-10
2023-03
SE FL Houses percentage increase since 02/2006 (closing prices)
+80%
+60%
+40%
+20%
0%
-20%
-40%
-60%
2006-02
2006-07
2006-12
2007-05
2007-10
2008-03
2008-08
2009-01
2009-06
2009-11
2010-04
2010-09
2011-02
2011-07
2011-12
2012-05
2012-10
2013-03
2013-08
2014-01
2014-06
2014-11
2015-04
2015-09
2016-02
2016-07
2016-12
2017-05
2017-10
2018-03
2018-08
2019-01
2019-06
2019-11
2020-04
2020-09
2021-02
2021-07
2021-12
2022-05
2022-10
2023-03

FIG. 8

Bed rooms[2]	Gross Sq.Ft. (Sq Ft)[3]	City[4]	Address[5]	List Price[6]	Property type[7]	View[8]	Year built[9]	Status of the listing[10]	Closing Date[11]	Pending Date[12]	Sold Price[13]	$ / SqFt as sold[14]	Interior size (sqft)[15]	Sold ÷ Assessed[16]
2	1110	Miami Beach	2850 Pine Tree Dr #8	$320K	Residential	Other View	1951	Closed	≤2016-07-01≥	2016-05-05	293K	$264	1110	1.09
2	1088	Miami Beach	2850 Pine Tree Dr #7	$250K	Residential	Garden View	1951	Closed	≤2018-05-21≥	2018-04-23	248K	$227	1088	0.943
2	1173	Miami Beach	2850 PINE TREE Dr #1	$295K	Residential	Other View	1951	Closed	≤2018-10-18≥	2018-08-14	289	$0.246	1173	0.00107
2	1128	Miami Beach	2858 PINE TREE Dr #5	$258K	Residential	Garden View	1966	Closed	≤2017-05-18≥	2017-04-25	253K	$224	1128	0.824
1	688	Miami Beach	2858 Pine Tree Dr #4	$179K	Residential	None	1966	Closed	≤2021-01-08≥	2020-11-30	160K	$233	688	1.25

FIG. 9

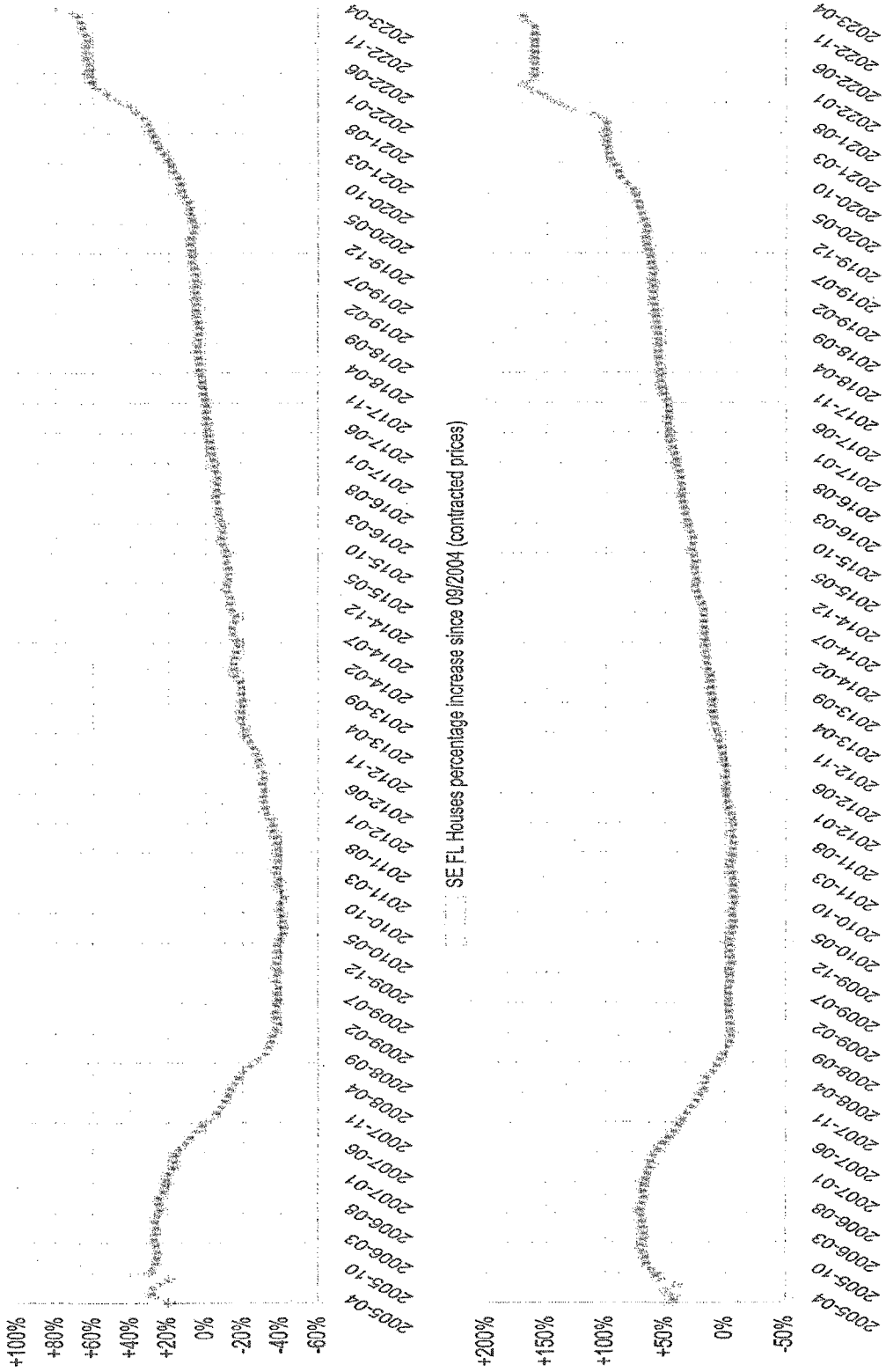
SE FL Condos percentage increase since 09/2004 (contracted prices)
+100%
+80%
+60%
+40%
+20%
0%
-20%
-40%
-60%
2005-04
2005-10
2006-03
2006-08
2007-01
2007-06
2007-11
2008-04
2008-09
2009-02
2009-07
2009-12
2010-05
2010-10
2011-03
2011-08
2012-01
2012-06
2012-11
2013-04
2013-09
2014-02
2014-07
2014-12
2015-05
2015-10
2016-03
2016-08
2017-01
2017-06
2017-11
2018-04
2018-09
2019-02
2019-07
2019-12
2020-05
2020-10
2021-03
2021-08
2022-01
2022-06
2022-11
2023-04
SE FL Houses percentage increase since 09/2004 (contracted prices)
+200%
+150%
+100%
+50%
0%
-50%
2005-04
2005-10
2006-03
2006-08
2007-01
2007-06
2007-11
2008-04
2008-09
2009-02
2009-07
2009-12
2010-05
2010-10
2011-03
2011-08
2012-01
2012-06
2012-11
2013-04
2013-09
2014-02
2014-07
2014-12
2015-05
2015-10
2016-03
2016-08
2017-01
2017-06
2017-11
2018-04
2018-09
2019-02
2019-07
2019-12
2020-05
2020-10
2021-03
2021-08
2022-01
2022-06
2022-11
2023-04

FIG. 10

1 33---.Condos.SE Florida.htm
2 33---.Houses.SE Florida.htm
3 330--.Condos..htm
4 330--.Houses..htm
5 3300-.Condos..htm
6 3300-.Houses..htm
7 33004.Condos.Fort Lauderdale.htm
8 33004.Houses.Fort Lauderdale.htm
9 33008.Condos.Hallandale Beach.htm
10 33008.Houses.Hallandale Beach.htm
11 33009.Condos.Hallandale Beach.htm
12 33009.Houses.Hallandale Beach.htm
13 3301-.Condos..htm
14 3301-.Houses..htm
15 33010.Condos.Miami Springs.htm
16 33010.Houses.Miami Springs.htm
17 33012.Condos.Hialeah.htm
18 33012.Houses.Hialeah.htm
19 33013.Condos.Hialeah.htm
20 33013.Houses.Hialeah.htm
21 33014.Condos.Hialeah.htm
22 33014.Houses.Hialeah.htm
23 33015.Condos.Miami Lakes.htm
24 33015.Houses.Miami Lakes.htm
25 33016.Condos.Hialeah.htm
26 33016.Houses.Hialeah.htm
27 33018.Condos.Brownsville.htm
28 33018.Houses.Brownsville.htm
29 33019.Condos.Hallandale Beach.htm
30 33019.Houses.Hallandale Beach.htm
31 3302-.Condos..htm
32 3302-.Houses..htm

FIG. 11

MLS:= database of all multiple-listing service real estate transactions in SE Florida

FL-properties-2021:= database of county valuations of all properties in Florida as of 1/1/2021

Allreal:= inner join on the field of FOLIO_NUMBER of the databases MLS and FL-propereties-2021; and projection said join to all the fields on f MLS plus the field Just_Value from FL-properties-2021

Locale:=input, e.g. zipcode 33140

Property_type:= input, e.g. condominium apartments, which example type is coded in the Allreal dataset as Type=RE2

Sub_Allreal:= projection of Allreal onto the Locale and Property_type

Months:=all calendar months for which there is a closing date in Sub_Allreal

For each month in Months do:

- Transactions:= projection of Sub_Allreal to the closing date being within the month
- For each transaction in Transaction compute the r:= the ratio of the transactions closing price to the 2021 Just Value.
- Medium: the medium value of said ratio r among all of the transactions of the month

Output the graph of the change in said Medium as a function of the months.

FIG. 12

1. *MLS* := database of all multiple-listing service real estate transactions in SE Florida

2. *State_Parcels* := database of county valuations of all properties in Florida as of a fixed date, e.g. 1/1/2021

3. *Allreal* := inner **join** on the field of FOLIO_NUMBER of the databases *MLS* and *State_Parcels*; and **projection** of said join to all the fields on of *MLS* plus the field Just_Value from *State_Parcels* -- i.e.:
Allreal := **select** MLS.*, *State_Parcels*.Just_Value **from** *MLS*, *State_Parcels* **where** *MLS*.Folio_nbr=*State_Parcels*.Folio_nbr

4. Zipcodes := all the zipcodes in Allreal, i.e.:
Zipcodes := **select unique** Zipcode **from** *Allreal*

5. **for every** *zipcode* in *Zipcodes* **do** {

5.1. *Sub_Allreal* := **select** * **from** *Allreal* **where** *Allreal*.Zipcode = *zipcode*

5.2. *Months* := **select unique** (Closing_Date as yyyy-mm-dd).substring(1,7) from *Sub_Allreal*

5.3. **for each** *month* **in** *Months* **let** *Factor*[*zipcode,month*] := **select median** (Closing_Price/Just_Value) **from** *Sub_Allreal* **where** Closing_Date **is within** *month*

5.4. *reference_month* := **minimum**(*Months*) (Any month can be chosen to serve as the reference, in particular it could be the minimum (earliest) month or the maximum (latest) month.)

5.5. **Display** or **plot** *Factor*[*zipcode,**]/*Factor*[*zipcode.reference_month*] }

FIG. 13

SYSTEMS AND METHODS FOR EVALUATING HISTORICAL REAL ESTATE PRICE TRENDS

GOVERNMENT SUPPORT

[0001] This invention was made with government support under CNS2018611 and CNS1920182 awarded by the National Science Foundation. The government has certain rights in the invention.

BACKGROUND

[0002] Various services and methods exist for the estimation of the change over time in real estate prices in any given locale. These prior models typically compute the average or median sale price in the locale during each period and then compare said statistics between the various periods. Some models can compare based on property categories, but in the prior models there is an "apples to oranges" comparison. Even in a small locale (e.g., a single zip code), and even in a narrow category, there are vastly different properties being averaged. This creates a statistical bias when different periods are compared because in one time period a certain type of property (e.g., quality-built properties with a view) may dominate while in another time period another type of property (e.g., lower quality properties) may dominate. This bias becomes even stronger when larger areas are analyzed (e.g., at the county or state level) because demographic changes can favor sale activity more in cheaper subareas in one time period and in more exclusive subareas in another time period.

BRIEF SUMMARY

[0003] Embodiments of the subject invention provide novel and advantageous systems and methods for evaluating historical trends in real estate prices so that prices across time can be compared. This allows for an understanding of historical price trends and assists in a property evaluation or appraisal, as well as allowing for an analysis of comparables in estimating a reasonable offer for a property on the market. Given a timespan of interest, a locale, and a category of properties of interest, an objective historical trend in values can be computed by first evaluating the ratios between the realized prices of transactions and objective governmental assessment of the properties at some fixed point of time. Then, for each period the ratios of all transactions in that period can be averaged, followed by comparing said averages between different time periods.

[0004] In an embodiment, a system for evaluating a historical trend in real estate prices can comprise a processor and a machine-readable medium in operable communication with the processor and having instructions stored thereon that, when executed by the processor, perform the following steps: receiving first real estate data comprising a geographic locale, a category of real estate properties, and a timespan; receiving second real estate data comprising price information for each real estate transaction of a plurality of real estate transactions in the geographic locale, in the category of real estate properties, and in the timespan, the second real estate data comprising a sale price for each real estate transaction of the plurality of real estate transactions; receiving objective valuation data for each property of the plurality of real estate transactions, the objective valuation data comprising an objective valuation at a fixed valuation date for each property of the plurality of real estate transactions, the objective valuation being from a third-party source that was not involved (e.g., not a seller, a buyer, a property appraiser utilized in the transaction, an agent of the seller or the buyer, an employee of the seller or the buyer, or someone contracted by the seller or the buyer) in any real estate transaction of the plurality of real estate transactions; computing a ratio, for each real estate transaction of the plurality of real estate transactions, of the respective sale price to the respective objective valuation; partitioning the timespan into a plurality of time periods (each time period of the plurality of time periods can optionally be the same as each other time period of the plurality of time periods, though this is not necessary); and applying a statistical aggregation function on each time period, comprising applying the statistical aggregation function on all ratios within the respective time period to provide the historical trend of real estate prices relative to the objective valuation data. The geographic locale can be, for example, a zip code, a neighborhood, a town, a city, a county, a metropolitan area, or a state. The category of real estate properties can be, for example, single-family dwellings, condominium apartments, multiple-family dwellings, houses of a predetermined size range, commercial real estate (e.g. of a predetermined size range), or vacant land. The statistical aggregation function can be, for example, a median or a mean. Each time period of the plurality of time periods can be, for example, a month, a quarter, or a year. The fixed valuation date for each property of the plurality of real estate transactions can be, for example, a specific date on which a governmental entity (e.g., a local governmental authority) publishes its assessment valuation(s) (e.g., for the entire geographic locale). The instructions when executed can further perform the following step: removing any outliers from the plurality of real estate transactions before applying the statistical aggregation function. A real estate transaction can be considered an outlier if a characteristic of the real estate transaction is outside a predetermined range compared to the remaining real estate transaction of the plurality of real estate transaction (e.g., based on the ratio, property improvement dates, and/or irregular transaction types (e.g., foreclosure, short sale)). The system can further comprise a display in operable communication with the processor. The instructions when executed can further perform the following steps: providing a first plot of the historical trend of real estate prices relative to the objective valuation over the timespan; and displaying the first plot on the display. The instructions when executed can further perform the following steps: computing a percentage difference of the statistical aggregation function for each time period compared to the statistical aggregation function of all time periods of the timespan; providing a second plot of the percentage difference for each time period over the timespan; and displaying the second plot on the display. The instructions when executed can further perform the following steps: partitioning the geographic locale into a plurality of sub-locales (e.g., to create a hierarchy of locales, thereby enabling the comparison of a locale to its neighbors as well as to the geographic locales contained therein); applying the statistical aggregation function independently on each sub-locale of the plurality of sub-locales; and comparing a result of applying the statistical aggregation function for a first sub-locale of the plurality of sub-locales to that of a second sub-locale of the plurality of sub-locales. The third-party source that was not involved in any real

estate transaction of the plurality of real estate transactions can be, for example, a governmental entity. The objective valuation can be, for example, "Just Value" as provided by certain counties in the state of Florida.

[0005] In another embodiment, a method for evaluating a historical trend in real estate prices can comprise: receiving (e.g., by a processor) first real estate data comprising a geographic locale, a category of real estate properties, and a timespan; receiving (e.g., by the processor) second real estate data comprising price information for each real estate transaction of a plurality of real estate transactions in the geographic locale, in the category of real estate properties, and in the timespan, the second real estate data comprising a sale price for each real estate transaction of the plurality of real estate transactions; receiving (e.g., by the processor) objective valuation data for each property of the plurality of real estate transactions, the objective valuation data comprising an objective valuation at a fixed valuation date for each property of the plurality of real estate transactions, the objective valuation being from a third-party source that was not involved in any real estate transaction of the plurality of real estate transactions; computing (e.g., by the processor) a ratio, for each real estate transaction of the plurality of real estate transactions, of the respective sale price to the respective objective valuation; partitioning (e.g., by the processor) the timespan into a plurality of time periods (each time period of the plurality of time periods can optionally be the same as each other time period of the plurality of time periods, though this is not necessary); and applying (e.g., by the processor) a statistical aggregation function on each time period, comprising applying the statistical aggregation function on all ratios within the respective time period to provide the historical trend of real estate prices relative to the objective valuation data. The geographic locale can be, for example, a zip code, a neighborhood, a town, a city, a county, a metropolitan area, or a state. The category of real estate properties can be, for example, single-family dwellings, condominium apartments, multiple-family dwellings, houses of a predetermined size range, commercial real estate (e.g. of a predetermined size range), or vacant land. The statistical aggregation function can be, for example, a median or a mean. Each time period of the plurality of time periods can be, for example, a month, a quarter, or a year. The fixed valuation date for each property of the plurality of real estate transactions can be, for example, a specific date on which a governmental entity (e.g., a local governmental authority) publishes its assessment valuation(s) (e.g., for the entire geographic locale). The method can further comprise removing (e.g., by the processor) any outliers from the plurality of real estate transactions before applying the statistical aggregation function. A real estate transaction can be considered an outlier if a characteristic of the real estate transaction is outside a predetermined range compared to the remaining real estate transaction of the plurality of real estate transaction (e.g., based on the ratio, property improvement dates, and/or irregular transaction types (e.g., foreclosure, short sale)). The method can further comprise: providing (e.g., by the processor) a first plot of the historical trend of real estate prices relative to the objective valuation over the timespan; and displaying (e.g., by the processor) the first plot (e.g., on a display, such as a display in operable communication with the processor). The method can further comprise: computing (e.g., by the processor) a percentage difference of the statistical aggregation function for each time period compared to the statistical aggregation function of all time periods of the timespan; providing (e.g., by the processor) a second plot of the percentage difference for each time period over the timespan; and displaying (e.g., by the processor) the second plot (e.g., on a display, such as a display in operable communication with the processor). The method can further comprise: partitioning (e.g., by the processor) the geographic locale into a plurality of sub-locales; applying (e.g., by the processor) the statistical aggregation function independently on each sub-locale of the plurality of sub-locales; and comparing (e.g., by the processor) a result of applying the statistical aggregation function for a first sub-locale of the plurality of sub-locales to that of a second sub-locale of the plurality of sub-locales.

BRIEF DESCRIPTION OF DRAWINGS

[0006] FIG. **1** shows a table of property valuation by a county assessor.

[0007] FIG. **2** shows metadata of various property valuations by county assessor offices in Florida in the United States of America. The "just value" is an objective valuation that can be used in embodiments of the subject invention.

[0008] FIG. **3** shows a table of ratios of realized price, at various times, to the county "just value" on Jan. 1, 2021. Row 3 has an obvious error ($0.246 per square foot as sold) and can be disregarded as an outlier.

[0009] FIG. **4** shows a listing of quantity of sales transactions in each month in 2006-2007 in zip code 33175, excluding outliers, and their respective averages of the ratio of the sale price to the fixed objective metric of the county valuation as of Jan. 1, 2021. Months with less than six transactions (e.g., September 2007) may be excluded.

[0010] FIG. **5** shows a listing of the normalization of the average ratios (the realized prices divided by the 2021 county valuation) to month 2006-02 (February 2006); i.e., dividing by the average ratio of 2006-02. The last column shows the percentage increase since 2006-02.

[0011] FIG. **6** shows a table of the normalization of the average ratios (the realized prices divided by the 2021 county valuation) of January 2022 through June 2022 to month 2006-02 (February 2006); i.e., dividing by the average ratio of 2006-02. The last column shows the percentage increase since 2006-02.

[0012] FIG. **7** shows a plot of percentage change in the average ratios (the realized prices divided by the 2021 county valuation) in comparison to February 2006, versus time, for houses in zip code 33175.

[0013] FIG. **8** shows two plots (for condos on top and for houses on bottom) of percentage change in the average ratios (the realized prices divided by the 2021 county valuation) in comparison to February 2006, versus time, for condos and houses in southeast Florida (SE FL). These plots use the closing dates as the reference time.

[0014] FIG. **9** shows a table of multiple listing services (MLS) data showing the contract pending data, in addition to the closing date, as well as the ratio of the closed sale price to the 2021 county valuation.

[0015] FIG. **10** shows two plots (for condos on top and for houses on bottom) of percentage change in the average ratios (the realized prices divided by the 2021 county valuation) in comparison to February 2006, versus time, for condos and houses in SE FL. These plots use the dates of purchase contracts rather than the closing dates as the reference time.

[0016] FIG. **11** shows a representation of partitioning of SE FL into a hierarchy of smaller locales.

[0017] FIG. **12** shows pseudo code for an algorithm that can be used, according to an embodiment of the subject invention.

[0018] FIG. **13** shows pseudo code for an algorithm that can be used, according to an embodiment of the subject invention.

DETAILED DESCRIPTION

[0019] Embodiments of the subject invention provide novel and advantageous systems and methods for objectivizing real estate prices and/or evaluating historical trends in real estate prices, so that prices across time can be compared. This allows for an understanding of historical price trends and assists in a property evaluation or appraisal, as well as allowing for an analysis of comparables in estimating a reasonable offer for a property on the market. Given a timespan of interest, a locale (e.g., a particular zip code, a city, a county, or a state), and a category of properties of interest (e.g., condos, single-family dwellings, or multi-family dwellings), an objective historical trend in values can be computed by first evaluating the ratios between the realized prices of transactions and objective governmental assessment of the properties at some fixed point of time. Then, for each period (e.g., a week, a month, a set number of months, or a year) the ratios of all transactions in that period can be averaged, followed by comparing said averages between different time periods.

[0020] Systems and methods of embodiments of the subject invention evaluate historical real estate price trends. Input data to the system/method can include a geographic locale, the specification of a category of real estate properties, a timespan, and/or a set comprising a majority of purchase transactions of properties in said category (if applicable) during said timespan (if applicable) in said locale (if applicable), each of which transactions is associated with a date and the purchase price. The system/method can obtain an objective, authoritative property valuation dataset, which at a fixed approximate valuation date assigns valuation to each of a majority of real estate properties of said category (if applicable) in said locale (if applicable), which valuation has a mostly-consistent relationship to the true value of each real estate property in said locale as of said date. For each of said transactions, the system/method can compute the ratio between said price of the transaction and said valuation of the transacted property. The system/method can partition said timespan into time periods. The system/method can utilize a representative statistical aggregation function. For each of said time periods, the system/method can apply said aggregation function to the subset of said ratios that pertain to the transactions of said period. This can lead to a useful evaluation of historical real estate price trends (see also, e.g., FIGS. **7**, **8**, and **10**). FIGS. **12** and **13** show pseudo code for an algorithm that can be used in certain embodiments of the subject invention.

[0021] The geographic locale(s) can be, for example, a zip code, a neighborhood, a zone, a town, a city, a county, a metropolitan area, or a state. The categories of real estate properties can be, for example, single-family homes, condominium apartments, homes of a given size range, or vacant land. The representative statistical aggregation function(s) can include, for example, a median or an average. The time periods can be, for example, months, quarters, or years. The date associated with the transaction can be, for example, the closing date or the purchase contract effective date.

[0022] In some embodiments, outlier cleansing can be performed on the input data (e.g., before computing the ratio or after computing the ratio), and such outlier cleansing can be based on, for example: the ratios; the ratios and the dates; and/or additional data, which may include property improvement dates and/or irregular transaction types (foreclosure, short sale).

[0023] In some embodiments, the medians or averages (or other statistical aggregation function) of each period can be normalized to the base period (e.g., by dividing the median (or other function) of each period by the median (or other function) of the base period).

[0024] In some embodiments, the percentage increase and/or decrease of the median (or other function) of each period versus that of the base period can be calculated.

[0025] In some embodiments, the historical real estate price trend(s) can be presented as a chart or graph, with one axis being the timeline (or time periods) and the other axis being the median (or other function) or normalized version thereof or percentage of increase/decrease of the median (or other function) since the base period.

[0026] In some embodiments, large locales can be partitioned into smaller locales, thereby creating a hierarchy of locales and enabling the comparison of a locale to its neighbor(s) as well as to its subsuming locale(s).

[0027] Related art models that compare price per unit of size (e.g., price per interior square foot of a home) comingle properties of different type and/or quality (e.g., residences with a view and residences without a view, well-built houses and poorly built houses). Also, accounting for only one size metric, such as interior area, ignores other size metrics, such as lot size. Embodiments of the subject invention use models that objectivize real estate prices so that prices across time can be compared to understand historical price trends and also to assist in property evaluation or appraisal, as well as for the analysis of comparables in estimating a reasonable offer for a property on the market.

[0028] In order to objectivize and normalize real estate transactions across a locale and across a time period, embodiments of the subject invention can utilize a metric of valuation of properties that is consistent among all the properties in the locale at some point time. Said point in time of the objective metric does not need to be within said time period. Further, said metric does not have to represent the true value of each property at said point in time; rather, it has to be consistently related and/or proportional to the true value. Said relationship does not have to be a precise linear proportion, nor does it have to be truly consistent in 100% of the cases because said metric is only necessary for a statistical aggregation of a large numbers of cases. One such metric could be property valuation by local government tax assessors (e.g., the tax appraisal offices in most counties in the United States of America). Local government tax assessors (e.g., tax appraisal offices in counties in the U.S.) typically invest immense effort to attempt consistent valuation of all the properties under their jurisdiction, taking into account quantitative metrics (e.g., the size of the interior, the size of the lot, the year built, the year renovated (if applicable), the ground elevation, the floor level elevation of a condo in a building, the costs of improvement made based on the permits filed (if applicable), etc.) and qualitative

metrics (e.g., location, exposure, view, special features, etc.). For example, in Florida, the county assessor offices determine what they call the "just value" of the properties as of January 1 of the assessment year. In order to minimize litigation, the assessor's office typically sets the "just value" at 10-20% below the true value, which does not affect the model or algorithm of embodiments of the subject invention, as long as said discount is reasonably consistent.

[0029] It should be noted that government offices sometimes provide multiple types of valuations for tax purposes. FIG. **2** shows a listing of some official "valuations" available from Florida counties. Among these valuations, the only meaningful one for purposes of objective valuation is the "Just Value." The other valuations either reflect only a part of the property value (e.g., the Land Value or the Improvement Value) or are affected by the demographics of the property owner and, thus, are not meaningful for understanding the true value of the property.

[0030] Systems and methods of embodiments of the subject invention can compare the transactional sale price of each property, no matter when, to a one time-fixed metric of an objective valuation, in order to evaluate the ratio by which the realized price is above (or below) said metric. That is, said ratio is the ratio between the realized price and said objective metric. In the example shown in FIG. **3**, sales at different times are compared to the county's "Just Value" as of Jan. 1, 2021, to compute the ratio factor. It is noted that row 3 in the table of FIG. **3** contains an obvious data entry error. Therefore, there can be a data-cleansing process in order to disregard outliers that are outside a reasonable range. Data about the realized prices of each transaction can be obtained from databases (e.g., proprietary databases), such as those provided by data consolidators, from county or state records, or from the Real Estate Multiple Listing Service (MLS), as in FIG. **3**.

[0031] The ratio thusly computed is an objective comparison metric between different sale transactions in a locale at close times or across long timespans. In order to better compare sale transactions over time within a locale, properties can be subdivided into categories because it is possible that in different property categories, prices increased at different paces. For example, two categories of properties can be considered: single-family homes vs. condominium apartments (this is for exemplary purposes only and should not be construed as limiting; any quantity and combination of categories can be considered).

[0032] A locale of interest (e.g., zip code 33175) can be considered, as can a category of interest (e.g., single-family homes) and/or a timespan of interest (e.g., from Jan. 1, 2006, through Dec. 31, 2007). FIG. **4** shows a listing of such data as an example. Said timespan can be subdivided into periods (e.g., calendar months). In each period, for each sale transaction, the ratio of the price to the fixed objective metric (e.g., the 2021 County "Just Value") can be evaluated. Outlier transactions can be excluded based on any criteria of outlier exclusion. For each period, a representative statistical aggregator of the ratios can be evaluated (e.g., the average of the ratios or the median of the ratios, of all the relevant sale transactions). Months with a very low number of transactions (e.g., less than 6) may be excluded to avoid the possibility of excess weight of any single transaction, which may cause bias in statistical analysis across time.

[0033] In order to facilitate human comprehension of said average (or median) ratios, they may be normalized to a specific period (e.g., a month) as the base (e.g., the beginning month of said timespan); that is, by computing the factor as the median ratio of any given month divided by the median ratio of the base period. Average (or median) prices can thereby be expressed as the percentage increase (or decrease) since the base month, as in FIGS. **5** and **6**. In order for users to better understand the results, said factors can be presented as a graph, as in FIG. **7**. FIG. **7** indicates how property values in the locale changed over time. The locale can be of any size, as long as there are enough sale transactions therein to make a statistically significant analysis. The example in FIG. **8** shows the entire southeast Florida (SE FL) region as one locale and differentiates two property categories: condominium units; and single-family homes.

[0034] In some embodiments, the contract pending date can be used as an alternative to the closing date. The closing date of property sale transactions have an imperfection in their utility to assess the contemporary market sentiment. This is because the market sentiment is manifested at the time of the execution of a contract for purchase and sale between the buyer and the seller, while the closing of the transaction typically occurs a month or a couple of months later. In order to capture the timeliness of the market sentiment more precisely, transactions that have closed can be considered but dated at the purchase contract's effective date rather than at the closing date. Said purchase contract date can typically be obtained from MLS data sources (where it is often referred to as the "Pending Date"; i.e., the date the property went under a purchase contract and became pending closing), as in FIG. **9**.

[0035] By reanalyzing the same data for sales closed between January 2006 and June 2012, the graphs in FIG. **10** more accurately show the timely market sentiment during most periods, compared to FIG. **8**. Although in this embodiment, more accurate market sentiment analysis is present in most periods, there may be noise bias at the edges. The two rightmost data points in the example in FIG. **10** aggregate properties closed by June 2022 but contracted for purchase in May 2022 or June 2022 (because the chosen timespan in this example is user-defined as properties closed from January 2006 to June 2022). Because the time elapsing between the contract date and the closing date in May and June's data is very short, these data points are biased towards cash sales (not contingent on mortgages), which often allow the buyer to negotiate lower prices. This bias can be excluded by disregarding the rightmost edge of the chart. There is also a bias noise at the left edge of the chart because the leftmost points include a few unusual transactions with contract dates as early as April 2005 that were closed in January 2006 or later. This bias can be excluded by disregarding the transactions where the purchase contract date is prior to the beginning of the user-chosen timespan (in this example, January 2006).

[0036] Large locales (e.g., states and metropolitan areas) can be partitioned into smaller locales (e.g., townships and zip codes), thus enabling the comparison of a locale to its neighbors as well as to its subsuming locales. A representative statistical aggregator function is a function that matches any set of numbers to a single number intended to be a typical representative of said set. Examples of representative statistical aggregator functions are: median ("pure median"); average ("pure average"); average of the input set's elements excluding the lowest 10% and the highest 10% of said set; 0.5*median+0.5*average; 0.3*median+0.

7*(average of the input set's elements excluding the lowest 5% and the highest 9% of said set); and average of the input set's elements, excluding those elements that are outside predefined outlier thresholds of minimum 0.5 and maximum 1.5. Embodiments of the subject invention involve the computation of a representative statistical aggregator function of all the purchase transactions in a given locale during a given period. The easiest such aggregator function to compute is pure average. Among various statistical concerns with the pure average function, it may deliver significantly misleading results if the input data is not pre-cleansed of outliers. The pure median aggregator is more resilient to outliers, yet it still can benefit from the pre-cleansing of outliers. Outliers can be the result of erroneous data entry or the inclusion of esoteric transactions.

[0037] From the data cleansing algorithms' point of view, there are several types of outlier cleansing that can be applied to a dataset of said ratios between transactional prices and the fixed-date objective valuation, as listed below.

[0038] Fixed threshold: disregard transactions with ratios outside of a given range (e.g., a range of from 0.5 to 3.0).

[0039] Percentage threshold: for a given category of properties, locale, and period, disregard certain percentages of the lowest and the highest ratios (e.g., the lowest 10% and the highest 5%).

[0040] Statistically insignificant periods: for a given category of properties, locale, and period, if the number of the otherwise qualified transactions in the period is very small (e.g., less than 6), disregard all these transactions; i.e., skip this period for this locale (and for trend presentation purposes, interpolate this period from neighboring periods).

[0041] Date-dependent threshold: for transaction dates far removed from the fixed year of the valuation, allow more liberal thresholds than those close to the valuation year. For example, if the objective valuation date is Jan. 1, 2021, then for transactions in year y, where y<2021 (e.g., y=2010), set the minimum threshold to 0.7−0.05*(2021−y).

[0042] Semantic outliers that involve analysis of additional data fields, for example: if there is a data field indicating that this is a foreclosure sale, disregard the transaction for being esoteric with the expected price being too low; likewise, for short sales; and if there is a data field showing when the house was built (what in the governmental language is called "year of property improvement"), then disregard the transactions where said improvement date falls in between the transaction date and the fixed objective valuation date (this would prevent or inhibit, for example, the incorrect relating of the sale price of a building to the appraised value of bare land before the building was built).

[0043] Embodiments of the subject invention provide a focused technical solution to the focused technical problem of how to objectively evaluate historical trends in real estate prices. Embodiments of the subject invention can improve the device on which the processor is located by minimizing the resources dedicated to calculating any statistical trends because of the efficiency provided by the embodiments.

[0044] The methods and processes described herein can be embodied as code and/or data. The software code and data described herein can be stored on one or more machine-readable media (e.g., computer-readable media), which may include any device or medium that can store code and/or data for use by a computer system. When a computer system and/or processor reads and executes the code and/or data stored on a computer-readable medium, the computer system and/or processor performs the methods and processes embodied as data structures and code stored within the computer-readable storage medium.

[0045] It should be appreciated by those skilled in the art that computer-readable media include removable and non-removable structures/devices that can be used for storage of information, such as computer-readable instructions, data structures, program modules, and other data used by a computing system/environment. A computer-readable medium includes, but is not limited to, volatile memory such as random access memories (RAM, DRAM, SRAM); and non-volatile memory such as flash memory, various read-only-memories (ROM, PROM, EPROM, EEPROM), magnetic and ferromagnetic/ferroelectric memories (MRAM, FeRAM), and magnetic and optical storage devices (hard drives, magnetic tape, CDs, DVDs); network devices; or other media now known or later developed that are capable of storing computer-readable information/data. Computer-readable media should not be construed or interpreted to include any propagating signals. A computer-readable medium of embodiments of the subject invention can be, for example, a compact disc (CD), digital video disc (DVD), flash memory device, volatile memory, or a hard disk drive (HDD), such as an external HDD or the HDD of a computing device, though embodiments are not limited thereto. A computing device can be, for example, a laptop computer, desktop computer, server, cell phone, or tablet, though embodiments are not limited thereto.

[0046] When ranges are used herein, such as for weight ranges, combinations and subcombinations of ranges (e.g., subranges within the disclosed range), specific embodiments therein are intended to be explicitly included. When the term "about" is used herein, in conjunction with a numerical value, it is understood that the value can be in a range of 95% of the value to 105% of the value, i.e. the value can be +/−5% of the stated value. For example, "about 1 foot" means from 0.95 foot to 1.05 foot.

[0047] It should be understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application.

[0048] All patents, patent applications, provisional applications, and publications referred to or cited herein are incorporated by reference in their entirety, including all figures and tables, to the extent they are not inconsistent with the explicit teachings of this specification.

What is claimed is:

1. A system for evaluating a historical trend in real estate prices, the system comprising:

a processor; and

a machine-readable medium in operable communication with the processor and having instructions stored thereon that, when executed by the processor, perform the following steps:

receiving first real estate data comprising a geographic locale, a category of real estate properties, and a timespan;

receiving second real estate data comprising price information for each real estate transaction of a plurality of real estate transactions in the geographic locale, in the category of real estate properties, and in the timespan, the second real estate data comprising a sale price for each real estate transaction of the plurality of real estate transactions;

receiving objective valuation data for each property of the plurality of real estate transactions, the objective valuation data comprising an objective valuation at a fixed valuation date for each property of the plurality of real estate transactions, the objective valuation being from a third-party source that was not involved in any real estate transaction of the plurality of real estate transactions;

computing a ratio, for each real estate transaction of the plurality of real estate transactions, of the respective sale price to the respective objective valuation;

partitioning the timespan into a plurality of time periods; and

applying a statistical aggregation function on each time period, comprising applying the statistical aggregation function on all ratios within the respective time period to provide the historical trend of real estate prices relative to the objective valuation data.

2. The system according to claim **1**, the geographic locale being a zip code, a neighborhood, a town, a city, a county, a metropolitan area, or a state.

3. The system according to claim **1**, the category of real estate properties being single-family dwellings, condominium apartments, multiple-family dwellings, houses of a predetermined size range, commercial real estate, or vacant land.

4. The system according to claim **1**, the statistical aggregation function being a median or a mean.

5. The system according to claim **1**, each time period of the plurality of time periods being a month, a quarter, or a year.

6. The system according to claim **1**, the fixed valuation date for each property of the plurality of real estate transactions being a specific date on which a governmental entity publishes assessment valuations for the geographic locale.

7. The system according to claim **1**, the instructions when executed further performing the following step:

removing any outliers from the plurality of real estate transactions before applying the statistical aggregation function,

a real estate transaction being considered an outlier if a characteristic of the real estate transaction is outside a predetermined range compared to the remaining real estate transaction of the plurality of real estate transaction.

8. The system according to claim **1**, further comprising a display in operable communication with the processor,

the instructions when executed further performing the following steps:

providing a plot of the historical trend of real estate prices relative to the objective valuation over the timespan; and

displaying the plot on the display.

9. The system according to claim **1**, further comprising a display in operable communication with the processor,

the instructions when executed further performing the following steps:

computing a percentage difference of the statistical aggregation function for each time period compared to the statistical aggregation function of all time periods of the timespan;

providing a plot of the percentage difference for each time period over the timespan; and

displaying the plot on the display.

10. The system according to claim **1**, the instructions when executed further performing the following steps:

partitioning the geographic locale into a plurality of sub-locales;

applying the statistical aggregation function independently on each sub-locale of the plurality of sub-locales; and

comparing a result of applying the statistical aggregation function for a first sub-locale of the plurality of sub-locales to that of a second sub-locale of the plurality of sub-locales.

11. The system according to claim **1**, the third-party source that was not involved in any real estate transaction of the plurality of real estate transactions being a governmental entity.

12. A method for evaluating a historical trend in real estate prices, the method comprising:

receiving first real estate data comprising a geographic locale, a category of real estate properties, and a timespan;

receiving second real estate data comprising price information for each real estate transaction of a plurality of real estate transactions in the geographic locale, in the category of real estate properties, and in the timespan, the second real estate data comprising a sale price for each real estate transaction of the plurality of real estate transactions;

receiving objective valuation data for each property of the plurality of real estate transactions, the objective valuation data comprising an objective valuation at a fixed valuation date for each property of the plurality of real estate transactions, the objective valuation being from a third-party source that was not involved in any real estate transaction of the plurality of real estate transactions;

computing a ratio, for each real estate transaction of the plurality of real estate transactions, of the respective sale price to the respective objective valuation;

partitioning the timespan into a plurality of time periods; and

applying a statistical aggregation function on each time period, comprising applying the statistical aggregation function on all ratios within the respective time period to provide the historical trend of real estate prices relative to the objective valuation data.

13. The method according to claim **12**, the geographic locale being a zip code, a neighborhood, a town, a city, a county, a metropolitan area, or a state,

the category of real estate properties being single-family dwellings, condominium apartments, multiple-family dwellings, houses of a predetermined size range, commercial real estate, or vacant land,

each time period of the plurality of time periods being a month, a quarter, or a year, and

the third-party source that was not involved in any real estate transaction of the plurality of real estate transactions being a governmental entity.

14. The method according to claim **12**, the statistical aggregation function being a median or a mean.

15. The method according to claim **12**, the fixed valuation date for each property of the plurality of real estate transactions being a specific date on which a governmental entity publishes assessment valuations for the geographic locale.

16. The method according to claim **12**, further comprising removing any outliers from the plurality of real estate transactions before applying the statistical aggregation function,

a real estate transaction being considered an outlier if a characteristic of the real estate transaction is outside a predetermined range compared to the remaining real estate transaction of the plurality of real estate transaction.

17. The method according to claim **12**, further comprising:

providing a plot of the historical trend of real estate prices relative to the objective valuation over the timespan; and

displaying the plot on a display.

18. The method according to claim **12**, further comprising:

computing a percentage difference of the statistical aggregation function for each time period compared to the statistical aggregation function of all time periods of the timespan;

providing a plot of the percentage difference for each time period over the timespan; and

displaying the plot on a display.

19. The method according to claim **12**, further comprising:

partitioning the geographic locale into a plurality of sub-locales;

applying the statistical aggregation function independently on each sub-locale of the plurality of sub-locales; and

comparing a result of applying the statistical aggregation function for a first sub-locale of the plurality of sub-locales to that of a second sub-locale of the plurality of sub-locales.

20. A system for evaluating a historical trend in real estate prices, the system comprising:

a processor;

a display in operable communication with the processor; and

a machine-readable medium in operable communication with the processor and having instructions stored thereon that, when executed by the processor, perform the following steps:

receiving first real estate data comprising a geographic locale, a category of real estate properties, and a timespan;

receiving second real estate data comprising price information for each real estate transaction of a plurality of real estate transactions in the geographic locale, in the category of real estate properties, and in the timespan, the second real estate data comprising a sale price for each real estate transaction of the plurality of real estate transactions;

receiving objective valuation data for each property of the plurality of real estate transactions, the objective valuation data comprising an objective valuation at a fixed valuation date for each property of the plurality of real estate transactions, the objective valuation being from a third-party source that was not involved in any real estate transaction of the plurality of real estate transactions;

computing a ratio, for each real estate transaction of the plurality of real estate transactions, of the respective sale price to the respective objective valuation;

partitioning the timespan into a plurality of time periods;

applying a statistical aggregation function on each time period, comprising applying the statistical aggregation function on all ratios within the respective time period to provide the historical trend of real estate prices relative to the objective valuation data;

providing a plot of the historical trend of real estate prices relative to the objective valuation over the timespan; and

displaying the plot on the display,

the geographic locale being a zip code, a neighborhood, a town, a city, a county, a metropolitan area, or a state,

the category of real estate properties being single-family dwellings, condominium apartments, multiple-family dwellings, houses of a predetermined size range, commercial real estate, or vacant land,

the statistical aggregation function being a median or a mean,

each time period of the plurality of time periods being a month, a quarter, or a year,

the fixed valuation date for each property of the plurality of real estate transactions being a specific date on which a governmental entity publishes assessment valuations for the geographic locale,

the instructions when executed further performing the following step:

removing any outliers from the plurality of real estate transactions before applying the statistical aggregation function, and

a real estate transaction being considered an outlier if a characteristic of the real estate transaction is outside a predetermined range compared to the remaining real estate transaction of the plurality of real estate transaction.

* * * * *