A demonstration of sustainability arguments using house price data

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Abstract: Real estate is today seen through the widespread sustainability discourse where buildings and land use occupies a core position. Land and buildings are also subject to sustainability evaluations along environmental, social, cultural and economic dimensions. In this paper cross-sectional data on house prices and sales volumes from Budapest, Hungary, for the period 2000-09 are analysed using time-windows generated by the self-organizing map (SOM) algorithms. In particular, upper-market cases are related to sustainable innovations insofar as such exist, which is examined using interviews and field inspection. The results however suggest that such features are largely absent in the period of data collection, although future markets are likely to be different in this respect.

Keywords: House prices, the self-organizing map (SOM), urban sustainability, Budapest

1. Introduction

Real estate is today seen through the widespread sustainability discourse where buildings and land use occupies a core position (see Sayce et al., 2007; Ellison et al., 2007; Lorenz et al., 2008; Eichholz et al., 2009, 2010; Warren-Myers and Reed, 2010; Fuerst and McAllister, 2011; Lützkendorf et al., 2011). Land and buildings are also subject to sustainability evaluations along environmental, social, cultural and economic dimensions. A question of interest here therefore concerns the sustainability of the market outcome and the behaviour of actors such as developers and investors. Thus a feasible method needs to apply both real estate transaction price data and expert interviews about actor motivations and tendencies. On top of the price development target urban sustainability is incorporated as a more qualitative target as the aim is to compare the price development with various sustainability aspects across a variety of locations and typical market segments. This demonstration uses spatially disaggregated time-series (i.e. panel data) data on Budapest (1,7M inhabitants; the capital of Hungary) together with a quasi-dynamic modelling approach based on the self-organizing map (SOM) and fixed time-windows. The *c*. twenty interviewed experts represent real estate business, local government and NGO sectors.

The paper is organised in eight sections as follows. After this introduction the next section 2 discusses theory. Section 3 then explained the method. Section 4 gives an empirical background for the study. Section 5 presents a summary of the main points found from the interviews. Section 6 then presents the analysis with the SOM. Section 7 compares the outcome of the analysis with observation from on site field inspection. Lastly, section 8 makes brief and interim conclusions.

2. The framework for the empirical analysis

Assuming that housing development, and thereby also the housing market, comprise an important element for defining a location with stable property values (i.e. value stability, see Kauko, 2010), three issues are pertinent here:

(1) A grossly substandard level of housing is unacceptable for health and safety reasons. The quality – albeit largely a subjective indicator – therefore ought to develop in the same direction and with the same pace as the price level. This requirement of quality control pertains to the site and building specific attributes as well as to the characteristics of the surrounding environment, neighbourhood and the city as a whole.

(2) High quality alone is insufficient unless people can afford to buy (or rent) the products. In other words, affordability (often approximated as net income related to the average house price level) of the dwelling also ought to develop in the same direction and with the same pace as the price level. Thus some of the wealthiest areas are often at the same time economically unsustainable with respect to this criterion.

(3) The diversity of the product is crucial in this context. Even if quality and affordability criteria are fulfilled, a stable development of property value may not be sustainable unless a wide enough range (i.e. product variety generated for most apt selections to be made) of different quality and affordability levels comprises the market. This is because the drivers of sustainability such as production technology, community governance and consumption fashions tend to change fast and then it is vital not to have neglected any specific real estate package even if it may seem marginal at some stage.

Here it needs to be noted that ‘value stability’ indicator as such only identifies a limited range of factors within the economic sustainability dimension, which means that it is definitely not correct to call a place ‘sustainable’ even if it fulfils all three of the criteria above (se Kauko, 2010). Apart from these three criteria above that specifically relate to value stability, many other criteria can be related to sustainable real estate too: energy efficiency in buildings; use of renewable energy in buildings; pollution control in buildings; optimal density of a block/neighbourhood; public transportation availability; traffic pollution; social cohesion in the

neighbourhood/city; communicativeness in local/regional planning; and innovativeness of the region. These are in principle identifiable criteria and subject to evaluation along environmental, social and/or economic dimensions. The difficulties however arise from the observation that in many cases these dimensions are blended within one particular criterion (cf. Manzi et al., 2010). The above mentioned criteria are furthermore interlinked, which makes the evaluation predominantly a qualitative exercise.

Since the turn of the Millennium, the sustainability issue has been brought to the fore strongly. At present even mainstream real estate economists point out that investment in sustainability considerations such as green buildings can have direct economic benefits (long-term cost savings or increase in employee productivity) or indirect economic benefits (reputation, retaining loyal workforce, minimizing risk by preparing for future tightening of regulations) for market based actors, or non-economic benefits (ethical behaviour) for actors with soft budget constrains (see Eichholz et al., 2009).

3. The quasi-dynamic approach based on the SOM

The SOM is essentially a measurable similarity-based clustering and classification technique organised as a set of neural network algorithms. The main principle of the clustering is that the input data is ‘won’ by predefined output nodes when the response is measured in Euclidean distance in n-dimensional space. Stated differently, the output nodes receive ‘hits’ by one or more observations with strong resemblance in terms of the input variables. This technique works in three steps. First, to predefine the surface in terms of the number of potential clusters (nodes) and the parameters for adjustment of this map-like surface (feature map). Second, to train the map using a dataset of m observations (cases) measured as n variables (map layers). Third, to examine the resulting feature map in terms of similarities between nodes and intensities of selected nodes with respect to a given map layer. The similarity and intensity of any nodes can also be identified across all map layers when the location of a given node is fixed across these layers by definition – this output is now perceived as a landscape of the dataset for a given cross section. It is furthermore possible to illustrate a phenomenon by

showing outputs generated with subsequent cross-sections as ‘time-windows’. This is illustrated in figures 1 and 2. (See Kauko, 2006a, 2007 and 2009, for further descriptions of this methodology.)

In this case the data comprise streets in Budapest for which mean prices and volumes are calculated for four different property types. This data is furthermore labelled on the basis of street and district. When examining the ‘hits’ of the nodes it is to observe that a given node is labelled based on one particular case drawn from several similar cases. In this way, the number of ‘hits’ then also become a description of the reliability of the generalisation in terms of the measured variables. Thus, if the node has only one hit and given label, the reliability of the node to actually represent exclusively this particular street/district is 1/1 (100%). If the node has several hits the reliability declines asymptotically 1/N: two observations gives half reliability, three one third and so forth.

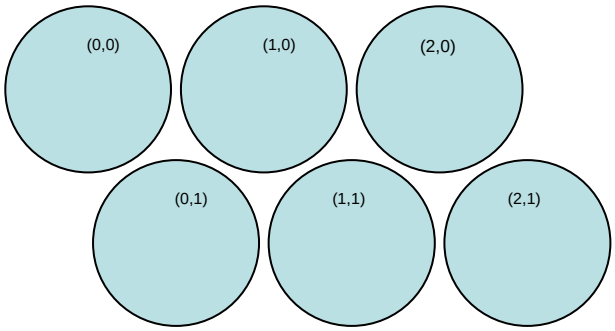

Figure 1: The situation of the nodes in a three-by-two (3x2) map

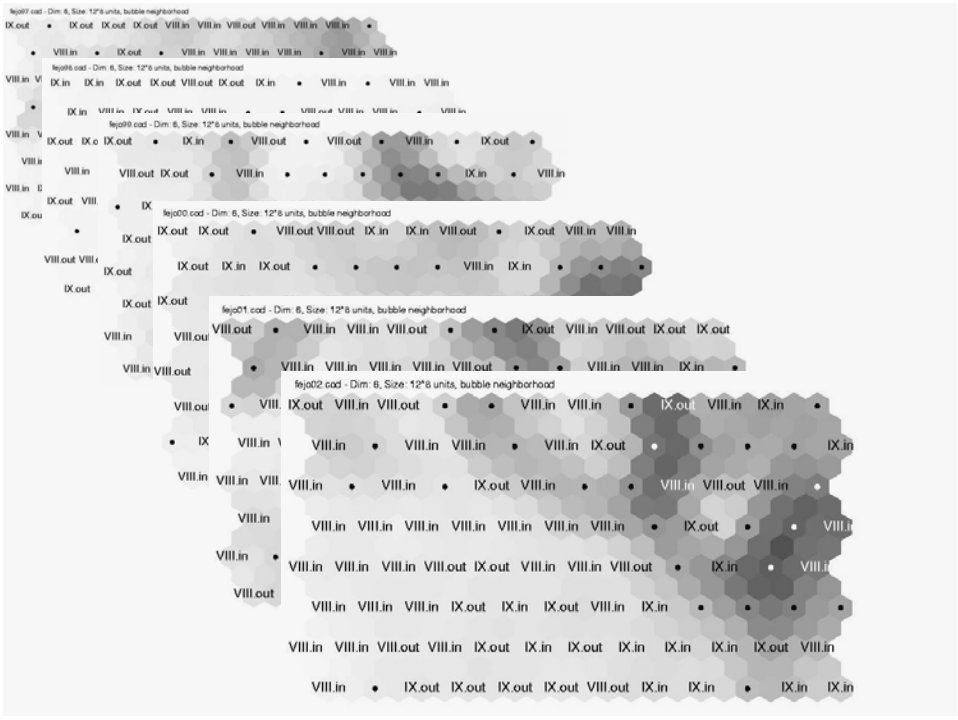

Figure 2: The method of fixed time-windows

Nonetheless, the SOM is only able to deal with numerical outcome data. To target the relevant processes we need to triangulate with qualitative information about the sustainability of property developments in the selected circumstances. The ultimate aim here is to see if a certain price development identified from the map outputs could be related to any kind of sustainable development insofar as upgrading has taken place during and before the years of data examination.

When contemplating the usefulness of such an extensively numerical and heavily computerized approach, the question is as to if there are other similar methods that would fit better. Obviously the SOM type of approach is not widespread – its heyday never really was, despite a peak in number of promising tries were carried out during the 90s (see Carlson, 1998; Kauko, 2006a, 2007). Today the quantitative research frontier is moving with the progress of machine

learning approaches such as cellular automata on one hand (e.g. Meen and Meen, 2003), and more actor oriented approaches such as multi-criteria decision making approaches on the other (e.g. Kauko, 2006b). Such approaches have undoubtedly become more popular than the SOM – or other neural network based approaches – in socioeconomic analysis.

To sum up the research strategy, the numerical and visual analysis afforded by the SOM approach is here confronted with the corresponding actual situation regarding urban sustainability, in order to examine if there is overlap between any kinds of innovativeness (or the lack thereof) and price premiums that are indentifiable from the map surface.

4. Empirical background

When examining historical developments, the post-socialist/communist context offer a potentially fertile ground to analyse the sustainability of urban property developments and markets. This context furthermore is well-placed when the approach looks for sustainable elements and innovativeness within the sustainability paradigm. At present it can be concluded that the urban property development of Budapest is private driven – thus the era of public private partnership (PPP) driven is over at least for the time being (cf. Keresztély and Scott, 2012). Development activity has furthermore spread outside cities to former industrial areas, logistics centres, villages and Greenfield sites. Even amidst such harmful tendencies, sustainability is gaining more importance in Hungary too.

Whilst much of the problem of creating a standardised understanding of sustainable design and construction stems from the differences in interpreting the triple bottom line approach – a normative construct – smaller niche developers are seen as the most promising actors with regard to the sustainability agenda (Dixon, 2007). However, as it is, in the Central and Eastern European (CEE) context development projects are almost exclusively of the large, supply-led type. This lack of demand-driven projects is one of two issues that tend to hand projects in CEE circumstances unfavourable sustainability evaluations. The other issue concern the lack of gov-

ernment guidance or support for these projects (cf. Keresztély and Scott, 2012).

The expected empirical findings will indicate housing market segments (locations or product types), where price developments correspond with a certain sustainability evaluation. This allows further analysis of why such a relationship might be plausible. For example, the implementation of building regulations increases the value of energy efficient buildings and developments, whereas loss of value will occur for other kinds of buildings and developments. Especially areas where the price levels are at the upper end of the market (high or higher average) are easily identifiable from the map surfaces. Such areas can be further classified onto two cases: those where also the turnover is exceptional high and those where it is normal. These cases are then analysed using field-inspection.

In the national statistics of KSH (the National statistical office) the recorded types of housing are condominiums (condos), panel flats and single-family homes as well as a total figure based on average price levels. That the data is 'official' and collected by government institution in principle should guarantee that the prices recorded for each year are statistically significant. These are defined into three categories: single-family homes, condominiums and panel housing.

5. Sustainability aspects in Hungary

Could an element of healthy innovativeness also be associated with a price premium? The future market might have it of course; for example, in the case of the on-going inner city (*Corvin Promenade*) and suburban (*Corvin Thermal Zugló*) projects by the Futureal group the brochure is rather optimistic as it mentions thermal water and heating as well as reinvestments in parks, schools, cultural buildings, heritage building renovation and even social/affordable housing. This is however a self acclaimed view of the developer-investor. One is left speculating as to the reality – or at least a more balanced view?

To be fair, 'green' developments are *de facto* becoming more common in this country too. Since 1 January, 2012, in Hungary energy-efficiency certifications have become compulsory for sellers and lessors for more than one year. This certificate follows the EU

directive and is valid for ten years. It identifies weaknesses in energy usage and makes suggestions for improving it. It can only be issued by certified and registered experts listed in a national regulatory authority database. (Tower Budapest, 2012)

On the basis of *c*. twenty expert interviews (private, public, NGO and academic affiliations) it was found that, in the Hungarian context of property value creation and price setting, four kinds of unsustainability problems exist:

(1) In the residential sector and also elsewhere concerning the surroundings of the building there is no price reduction for the lack of sustainable elements. This is because somehow the market actors are sceptical or ignorant, which presumably is a consequence of the socialist past. However, some promising tendencies are under way.

(2) The price-setting by the seller is unrealistic in a consumers market (falling demand; oversupply). New developments are almost completely seller-driven, which generates unsustainable tendencies in the price setting. The prevailing 'anything should go' mentality contradicts an establishment of buyer-driven frameworks that sustainability would require. Some of the interviews also suggested that, just like in Western Europe, regardless of which sustainable features are included, the market downturn does not allow opportunities to reap price/rent premiums from which improvements could be financed.

(3) Changes in land ownership and land use involve political and lobbying practices – corruption too – that are extremely unsustainable in the long run. This is partly about actual changes and partly about 'the stroke of the pen'. The general strategy (which myopically is a win/win one for both parts of the transactions) is as follows: someone buys agricultural land and then the politician, without carrying out any physical changes, redefines it as building land which is a far more valuable land use; then it is sold for many times its original price; finally, the seller returns a part of the profit to the political leader. The result of this sequence of events is not sustainable in any way.

(4) As pointed out by two of the interviewees, yet another problem arises from the mismatch between the prices paid for land during the market peak and prices expected from the sales or leases

of the completed floor-spaces. In spring 2011 90% of office developments are on hold due to the crises, and many of them will not be continued until the years 2015-16. If interest costs have to be paid for the financing of the sites for that time period, reselling the site without considerable economic losses becomes difficult. This regardless of potential value premiums stemming from the risk reduction for certified property.

The problem types listed above can be seen as variations of the same theme of price increases bringing sustainable as well as unsustainable consequences. The first problem, the lack of price reduction for unsustainable elements in a project, could be solved with a validated price model (e.g. an estimated hedonic price equation) that penalises for such features. The second problem, the seller-driven agenda and overpricing of new developments regardless of sustainability considerations in turn is more difficult to solve as this would require a comprehensive upgrading of the existing building stock for urban and suburban areas alike towards the quality level of new buildings. As for the third problem, unsustainable politics and lobbying practices, this would require anti-corruption legislation. For the fourth problem of too expensive site costs there is probably no solution. As the banks are hardly likely to give in, landowners have the options of panic sale or to wait – in both cases resulting in economic losses for years to come.

More than one of the private sector based interviewees underscores that, in general, due to the extremely global connections of the real estate industry developed after the transition (during the most neoliberal period 2002-10 in particular), Budapest is more affected by crisis than most other European cities. One of the problems here is that global planning and building trends tend to dominate the local ones. As long as the market situation is favourable the information about local circumstances is not transmitted to the developers. The solutions then remain standardised and not necessarily fit for a particular project. Thus, it is not then local solutions, but more often some kind of ‘core sustainability’ concepts that are applied trans-nationally in development projects. While the local governments are happy to attract the developers, the outcomes are however far from being sustainable (or even efficient) in such cases.

These findings do not preclude the emergence of promising sustainability strategies such as innovative 'green' office buildings, public infrastructure, and affordable housing. As one interviewee put it: "We expect that all sorts of things will increase the value – some of them are sustainable". Here it can be added that, unlike the previous government who uncritically embraced a neoliberal agenda, the current government (after the change in May 2010) has placed sustainability issues on the agenda, but these promises are nonetheless subdued by the prevailing market ignorance together with the deeply rooted unsustainable property and land speculation practices highlighted above.

6. Empirical analysis using the SOM

The variables comprise a set of indicators which was readily available from KSH (in their annual CD-rom of house price data). Data is recorded on mean sales prices per sqm and sales volumes aggregated on street and district levels. Both indicators are split onto four variables: single-family, condos, panel, and total figures. This way eight input variables are generated for the analysis with each variable enabling a market related interpretation.

The feature maps were generated using the following parameters: Software: *SOMPAK*, 24x16 map dimensions, bubble neighbourhood type, hexagonal topology, running length in basic run and fine-tuning 20,000 and 200,000 respectively, alpha (sensitivity parameter) 0.1 and 0.04, radius 20 and 6, and calibration based on street name (alternatively district number).

Some of the relevant map layers for our analysis are examined below. Intuitively 28 of these map layers are selected for the appendix. To interpret the position of the nodes and the grey-shade variations the key is that light colour indicates high price or turnover for a particular group of relatively similar observations, when the similarity between nodes means closeness within the map surface. (As already noted, the position of a given node remains fixed across all map layers in a one year surface.) We notice the following price associations:

2000: Typical cases with both the highest prices and highest turnover (i.e. where light colour zones overlap) are found for the node labelled Cseppkő utca (District II), for single-family cases.

Typical cases with the highest prices but with normal turnover are found for the node labelled Iskola utca (District I) for condominium cases and also for several single-family and panel cases on the Buda side.

2001: No typical cases with both high prices and turnovers. Typical cases with the highest prices but with normal turnover are found in several single-family, condominium and panel cases, mainly in District II. (The map layers shown in the appendix for this year and 2004 comprise all property types and labelled with district numbers 1-23.)

2002: No typical cases with both high prices and turnovers. Typical cases with the highest prices but with normal turnovers are found in various streets, mainly in Buda side districts II and XII (District II), but to some extent also in Pest side districts V, XIII and XIV.

2003: No typical cases with both high prices and turnovers. Typical cases with the highest prices but with normal turnovers are found in various streets, mainly in district II, but also in districts I, III and XII (all in Buda).

2004: No typical cases with both high prices and turnovers. Typical cases with the highest prices but with normal turnovers are found in various streets, mainly in Buda side districts II and XII, but to some extent also in Buda side district I (Buda) and Pest side districts V, VI, IX and XIV. Batthyány utca (I, panel) is picked as a typical example below.

2005: Typical cases with both relatively high prices and turnovers are found in district IV (Pest, single-family and condos). Typical cases with the highest prices but with normal turnovers are found mainly in Buda side districts I, II and XII, and in Pest side districts VI and IX. Here it is to observe that this is in the middle of the three year period with temporary housing market downturn discussed earlier, which implies that any particularly expensive cases are likely to possess some special attributes. Indeed this is the case with Lechner Ödön fasor (IX, condo, highest price, normal turnover) which is picked for closer inspection below.

2006: Typical cases with both relatively high prices and turnovers are found in districts III and XIV. Typical cases with the

highest prices but with normal turnovers are found mainly in Buda side districts II, II, XI and XII, and in Pest side districts V and XIII.

2007: Typical cases with both higher than average prices and turnovers are only found in district IX. Typical cases with the highest prices but with normal turnovers are found mainly in Buda side districts II, II and XI.

2008: Typical cases with both relatively high prices and turnovers are found in Buda side districts I, II, III, XI, XII and in Pest side district IV, but none of such cases are suspicious enough to be picked for further scrutiny. On the other hand, typical cases with the highest prices but with normal turnovers are found mainly in Buda side districts II, III and XII.

2009: Typical cases with both relatively high prices and turnovers are found in many districts, but only for the single-family case. Typical cases with the highest prices but with normal turnovers are found in almost all 23 districts, but especially many of them in districts II and III.

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Keresztély and Scott (2012, p. 1114) note that Budapest is surrounded by "an unbroken economic and residential agglomeration zone" that formed during the 90s due to the availability of Greenfield land. The homes here are mostly (but not exclusively) of the single-family type. This zone can thus be seen as an extension of the (new) suburban landscape of Budapest. Therefore, an interesting question is as to how different this area is from the area situated within city boundaries. To test this idea, the adjacent municipality of Budaőrs was added to the dataset on Budapest. In the labelling this subset then comprises a '24th district of Budapest'.

After running the extended cross sectional data sets 2000-09, the following result were obtained (map layers for the years 2002 and 2003 for single-family prices are shown in the appendix):

- 2000: Budaőrs comprises five distinct segments of different price and turnover levels with resemblance to other Budapest.
- 2001: Budaőrs comprises four or five distinct segments of different price and turnover levels with resemblance to other Budapest.

- 2002: Budaőrs is not identifiable.
- 2003: Budaőrs comprises one distinct segment of lower price and average turnover (N=1).
- 2004-2008: Budaőrs is not identifiable.
- 2009: Budaőrs comprises one distinct segment of very high price and low turnover (N=1).

We conclude that 2000-2001 Budaőrs is rather different to the rest of Budapest and thus can be considered a special case. However the situation changes markedly from 2002 onwards: then Budaőrs is rather similar to the rest of Budapest and thus not a special case, until 2009 when the situation changes again; namely, when the crisis hit Budapest, then only expensive niche products survived the market!

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To sum up this analysis, overall, almost all high price cases change every year between 2000 and 2009. Not only the absolute locations change but often also the basic character of what a sought after location that year is. This indicates a rather complex picture: that particular street-locations and house types are not constantly more expensive than others. For example, one year the highest price premium is for historic inner city property and the next it shifts to suburban Buda. Below this complexity is investigated further using field inspection of the streets with relatively high prices and possibly turnovers that were picked from the analyses above.

7. Field inspection regarding sustainability of the expensive cases found in the SOM analysis

It is likely that all the cases that show up with light colour (high prices or turnovers) in the map layers were built at a time when no sustainability or green considerations existed in Hungary. Nevertheless, from each cross-sectional analysis above maximum three street-addresses were picked for further investigation (in June and July 2012). Basically two kinds of cases were selected: (1) assumed niche markets where price is high but turnover low in relative terms; and (2) upper or upper-average markets where both price and turnover is high in relative terms. Fifteen cases were picked: four on

Pest side; eleven on Buda side; three of these comprise single-family; one of these both single-family and condo; two of these comprise panel; the rest (nine) comprise only condos. In the following the two most sustainable and two least sustainable cases are described based on personal field-inspection (N indicates number of hits and thereby reliability.)

Iskola utca (condo, Víziváros, District I, 2000/N=7): This is mostly about old, but renovated buildings. That only the prices are high but turnover remained low can be explained by the niche market characteristics of this case. It comprises inner city, heritage buildings; a central location nevertheless is on a quiet street; vintage buildings, renovated in harmony with the original design. It seems culturally sustainable, with a strong 'sense of place', and historical well-kept buildings.

Batthyány utca (panel, Víziváros, district I, 2004/N=4): On this street only one (but rather big) building can be categorised as panel and difficult to say which 'wave' it belongs to. Otherwise, the developments appear to fall into the condo category with mix of various eras. The result is much a similar evaluation as Iskola utca above, although panel buildings are less sustainable by definition than condo buildings.

Cseppkő utca (single-family, Csatárka, District II, 2000/N=1): This is mostly about modern villas, up in the Buda Hills, in a suburban setting. That both prices and turnover is high is not surprising given that this case represents the absolute upper-market in this city; it is luxury, isolated, no social life or 'sense of place'. It gives the feeling of monotonous, disjointed developments for the richest strata; furthermore, the lack of public infrastructure is worrying. These findings point to unsustainability.

Lechner Ödön fasor (condo, Ferencváros, district IX, 2005/N=1): This is a special case because of its explicit function as a new high-rise type of gated community overlooking the river. This can be characterised as 'bling' blocks of mixed development; or standard global development for the upper market – the type with concierge (a kind of 'snobbier' janitor service). It is luxury without real innovations: glass palaces that are called 'gardens' offer various services (including wine-cellar and 'boy' services) for the residents and others for the public. While it is still being built, the first flats

were completed around 2005, and sold to wealthy urban people as well as investors, many of which are foreign (Irish, for example). Many of the flats are still empty, which indicated that this is not a popular location for the buyer segment which is it intended for. Despite the river view this does not appear to be a pleasant location to live in, especially as the lower level flats have to face noise from either the suburban railway or a motorway immediately outside the block. Ostensibly no sustainable elements exist here; even the nearby Cultural Palace was debated and it is part of the same waterfront complex. This development was also known for suspicious land dealings.

Most of the 15 cases fall short of many sustainability criteria. Only one or two of these cases (Iskola utca, for sure; Batthyány utca, perhaps, but neither with particularly reliable SOM generalisation) receive an unambiguously positive sustainability evaluation, and that they do is largely due to the cultural dimension. On the positive side, the mixed natures of most developments can be noted and several of the cases are green. Many have also reasonably good accessibility by public transport. The results are nevertheless overall disappointing insofar as the higher end of the market cases could not really be associated with innovativeness concerning any sustainability aspect. It may not be surprising as such features are a new and marginal phenomenon in Hungary.

8. Conclusions

The immediate conclusion is that it is easy to illustrate upper-market cases using the approach based on the SOM. It is however more difficult to relate any such price premium to sustainable features in a given housing development or in its vicinity. Currently, or for the period 2000-09 at least, the analysis suggests that only the cultural dimension is strongly present in the Budapest context of sustainable housing development and housing market. Another benefit that might be worth registering is the mixed and green nature of the developments, although apparently the new stock is not as diverse in its composition as the old stock. Nevertheless, while the results suggest that sustainability innovations are largely absent in the period of data collection, future markets are likely to be different in this respect.

Acknowledgement: The author would like to thank KSH (The National statistical office in Hungary) and all interviewed Hungarian experts for making this research possible.

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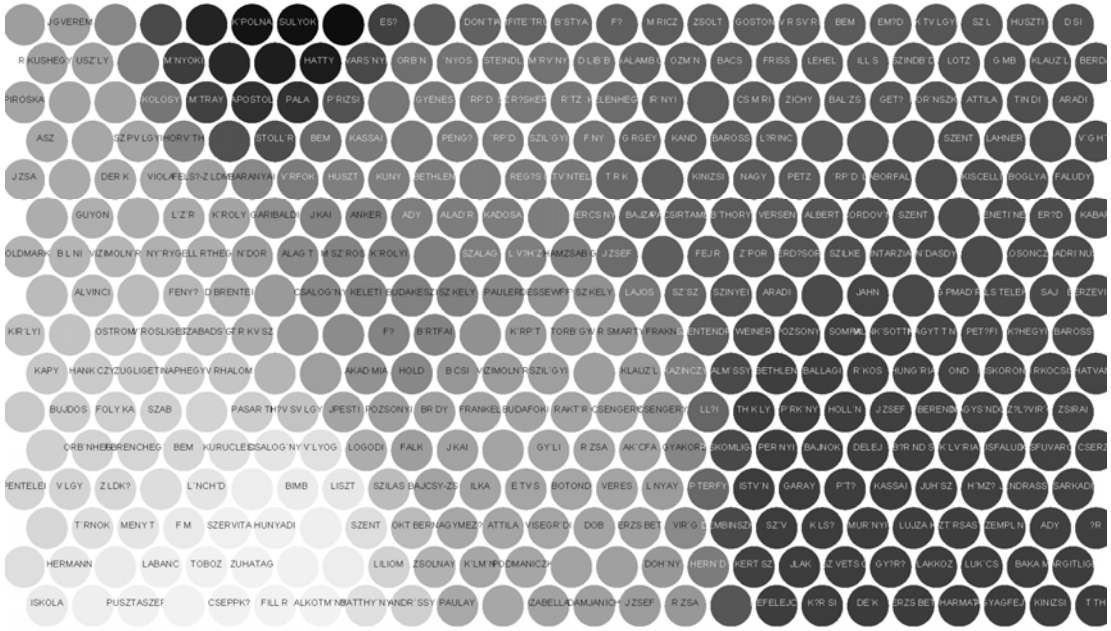
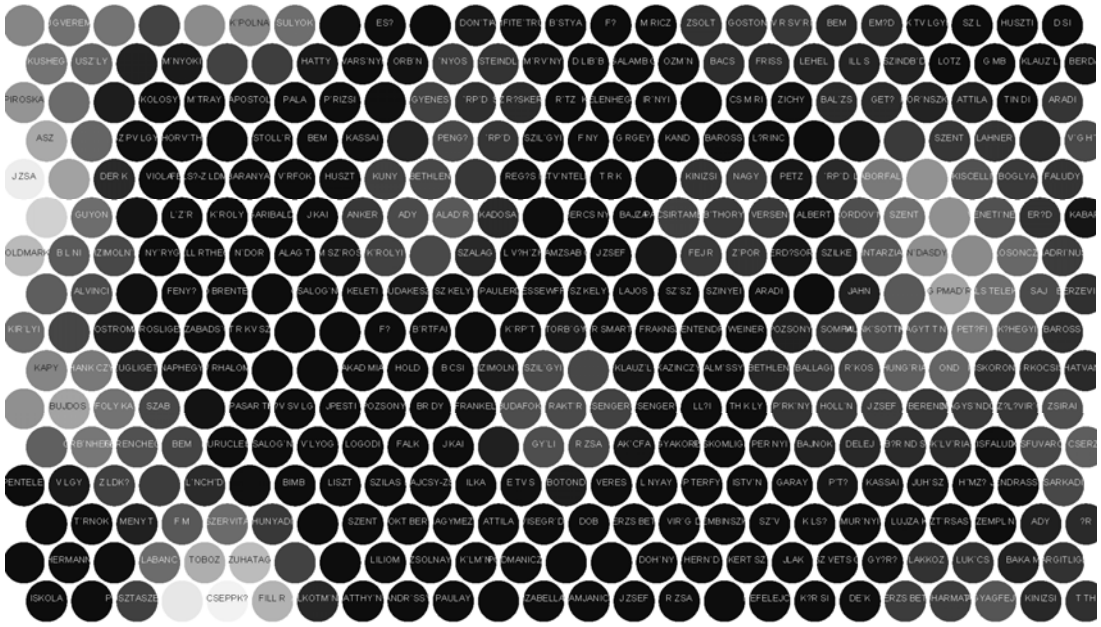
Appendix: Selected layers of the Feature maps

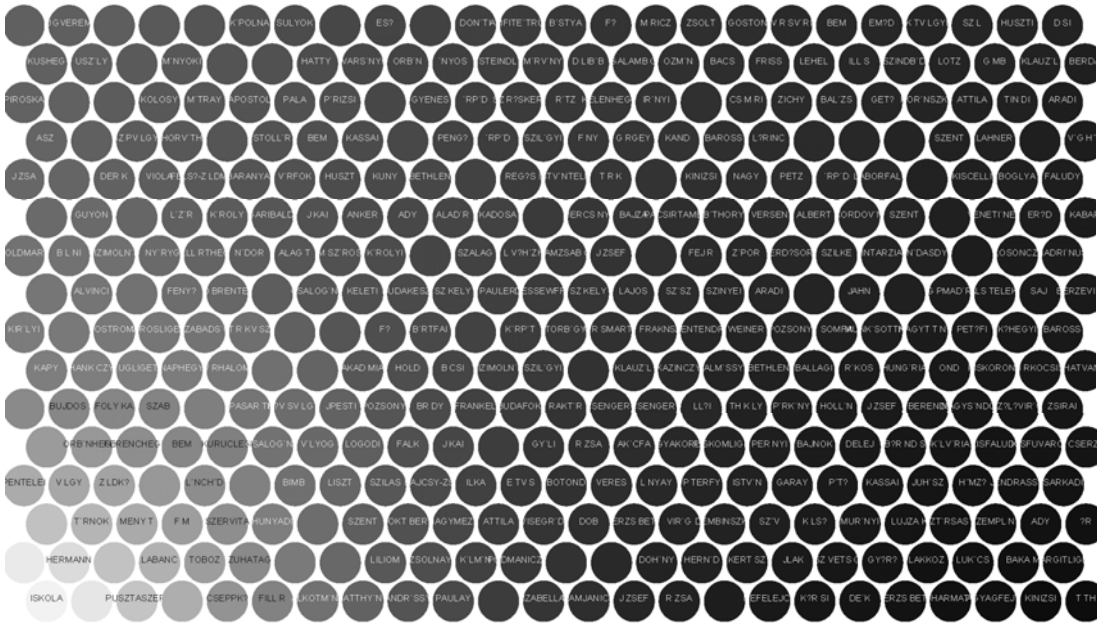
2000, Single-family prices (per sqm)



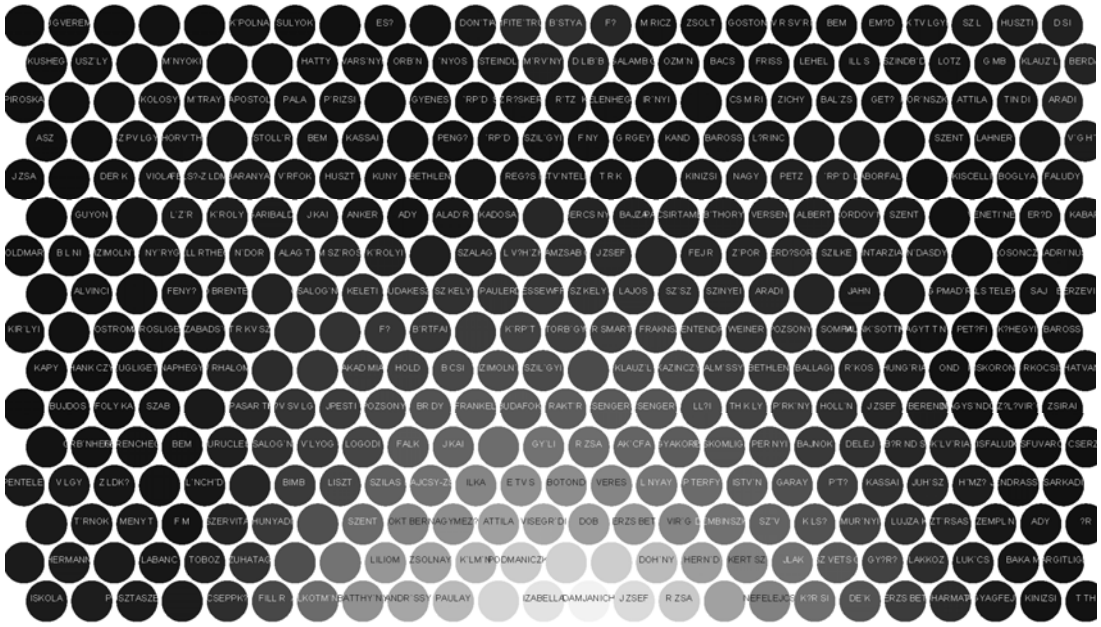
2000, Single-family volumes (turnover)



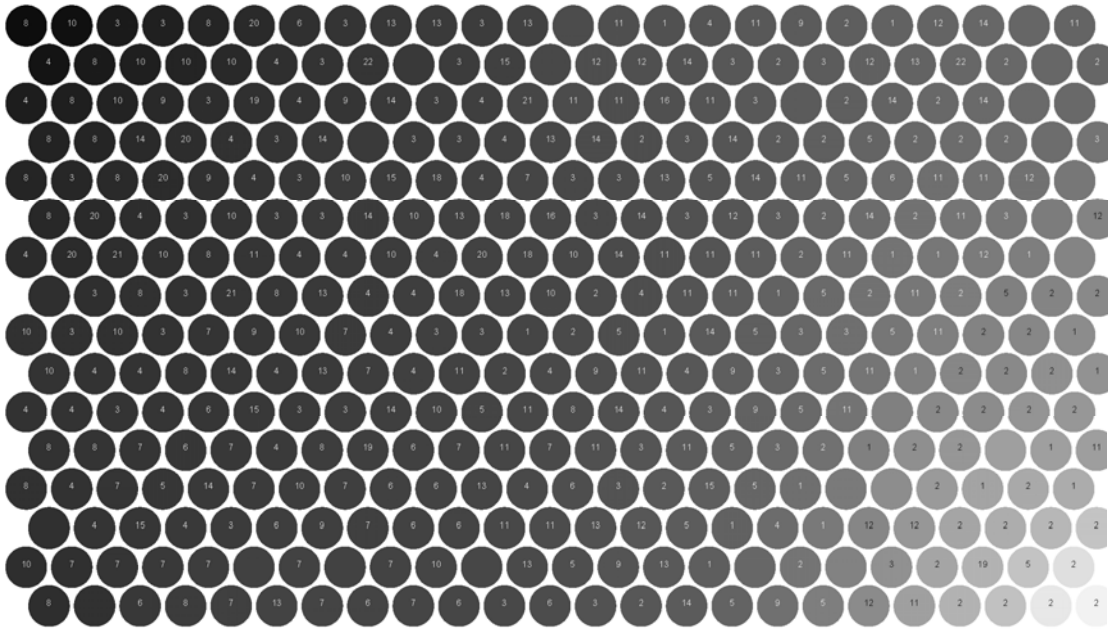
2000, Condo prices



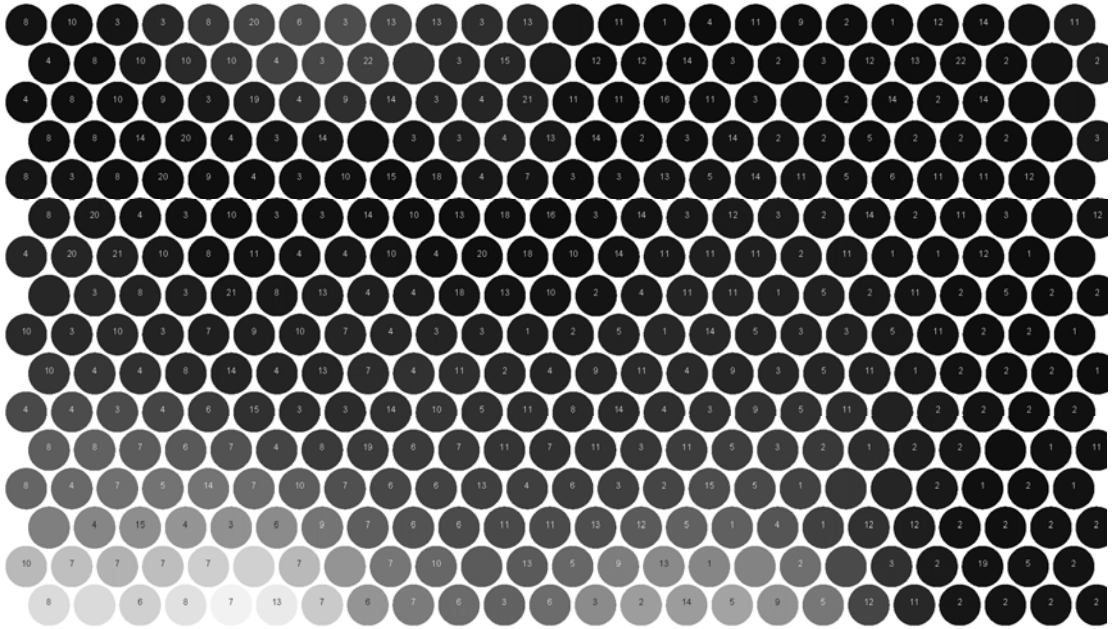
2000, Condo volumes



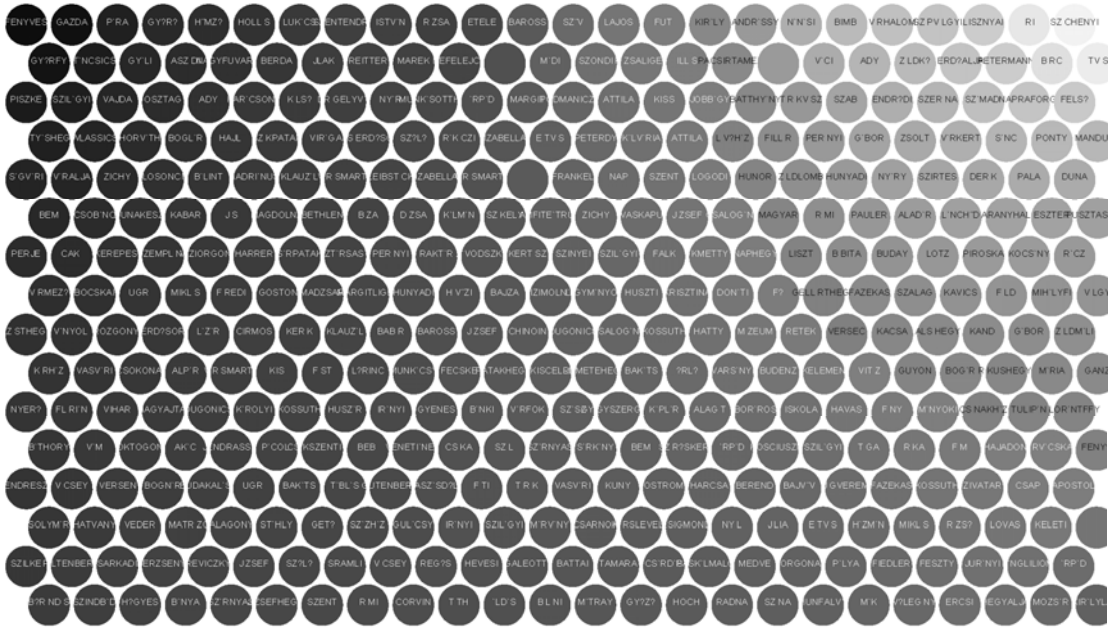
2001, Total prices



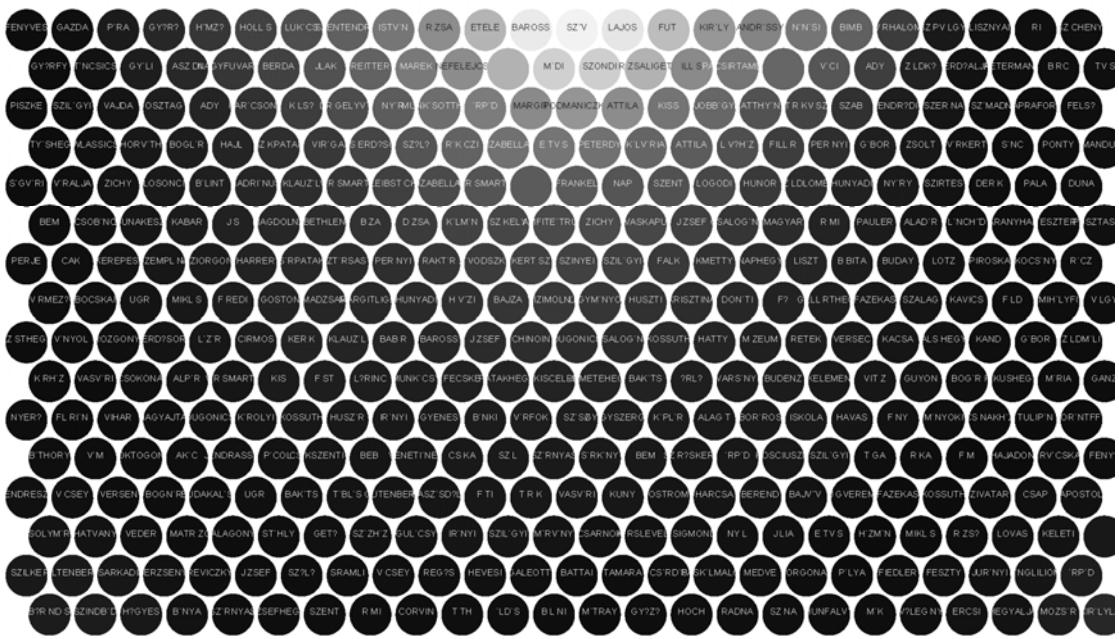
2001, Total volumes



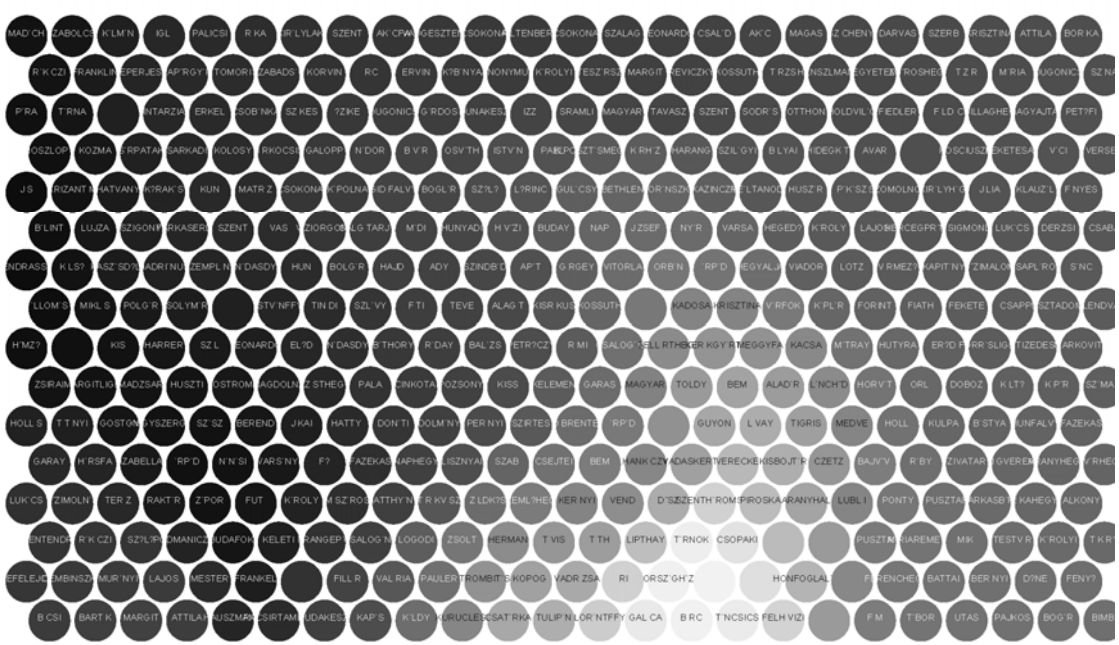
2002, Condo prices



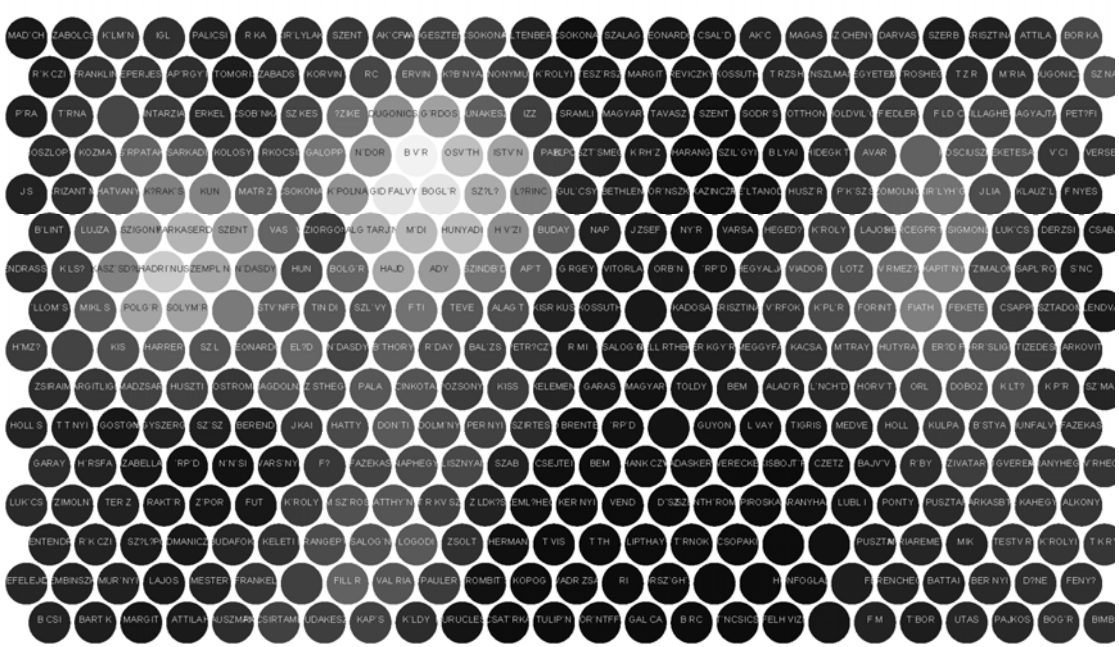
2002, Condo volumes



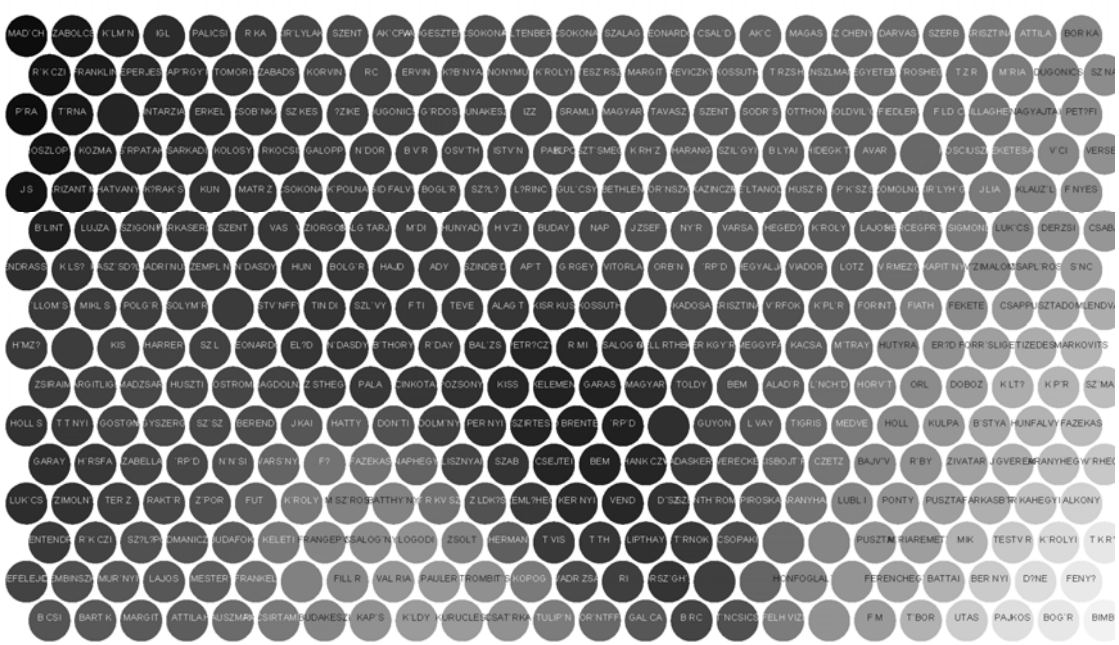
2003, Single-family prices



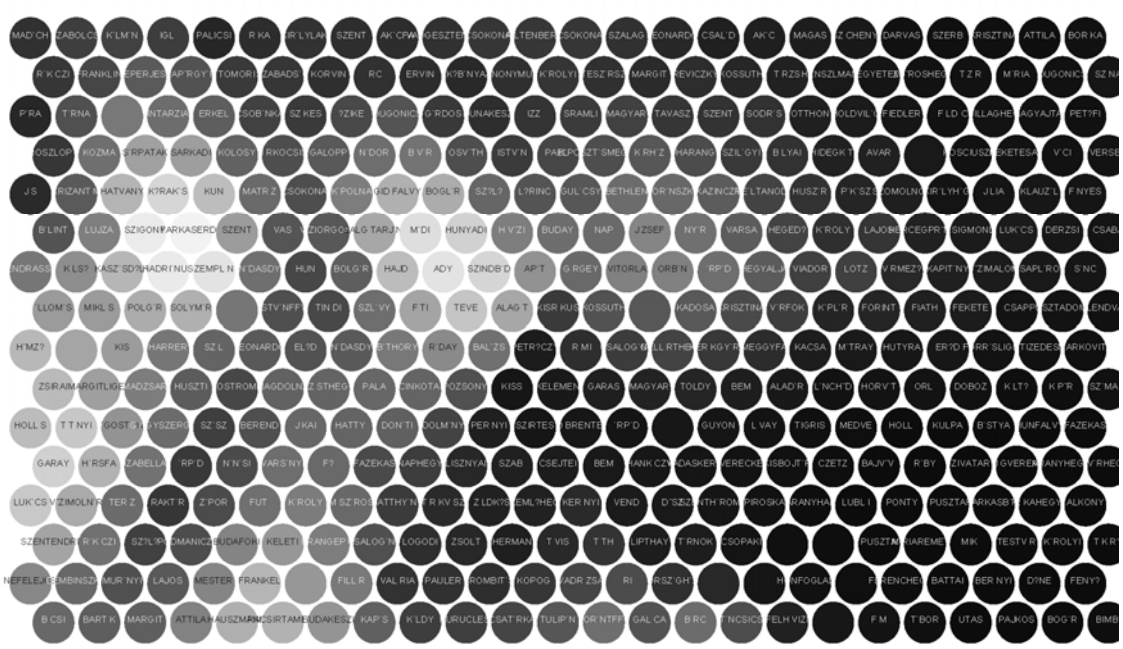
2003, Single-family volumes



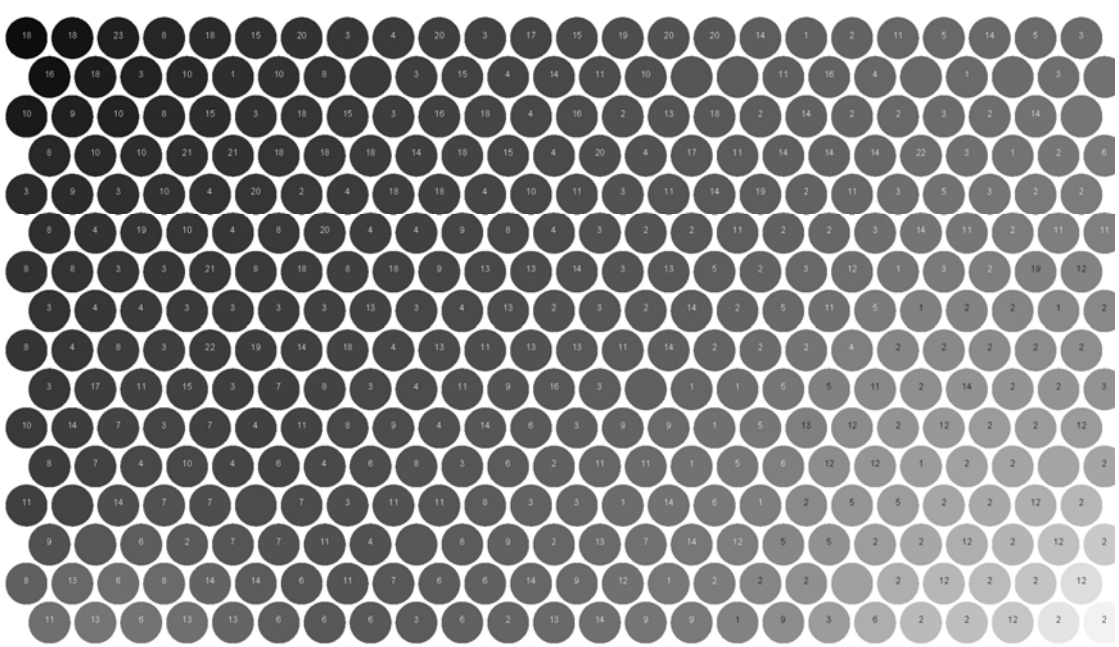
2003, Panel prices



2003, Panel volumes

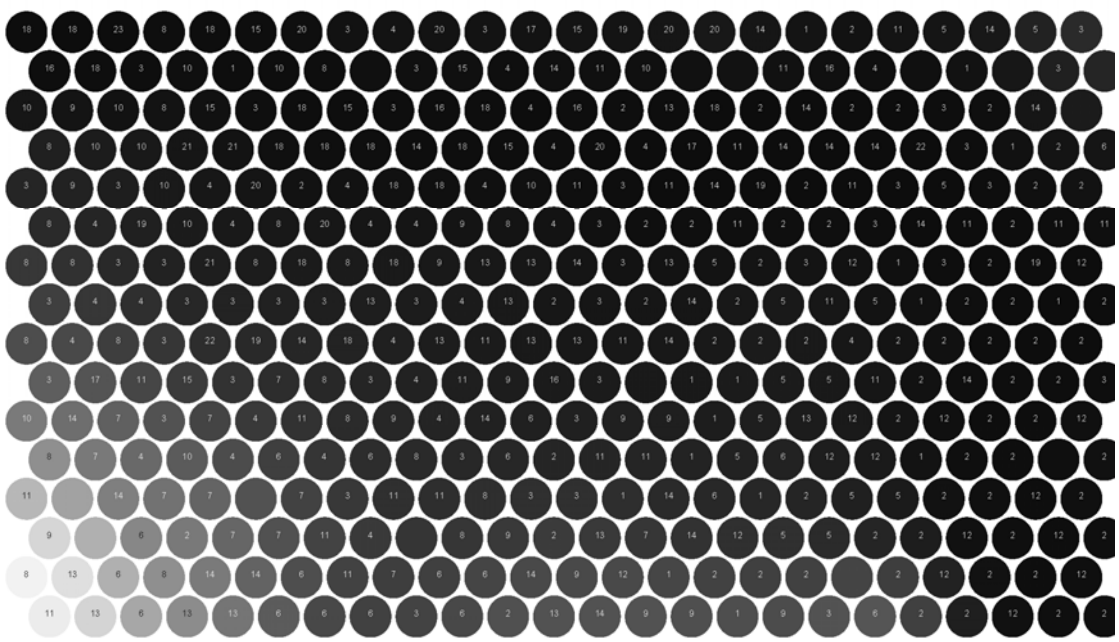


2004, Total prices

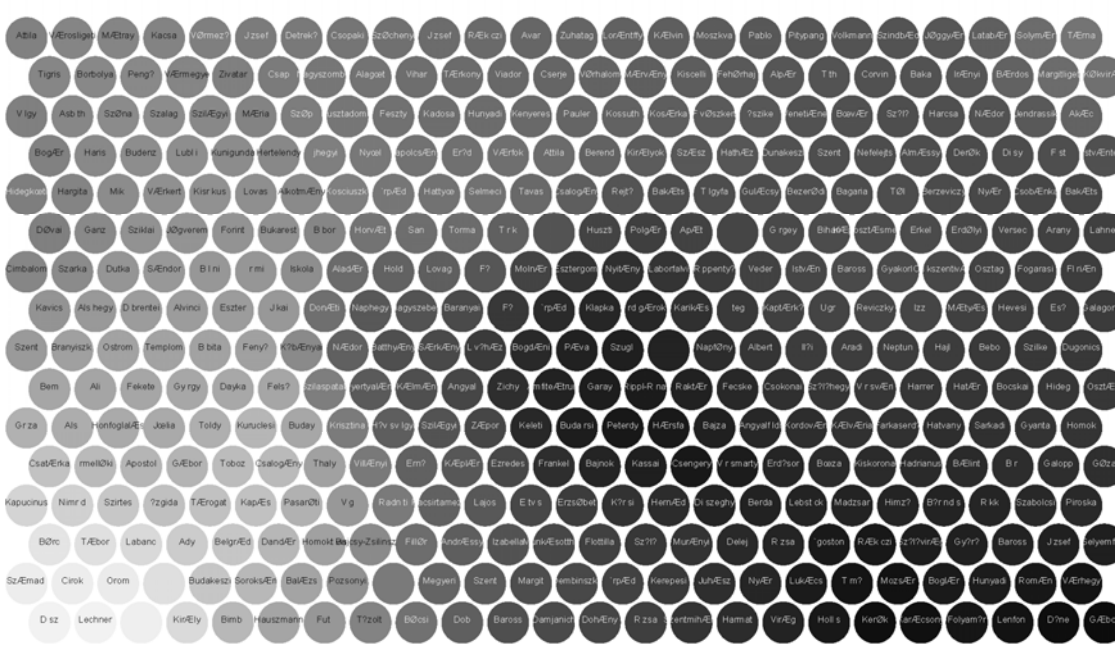


2004, Total volumes

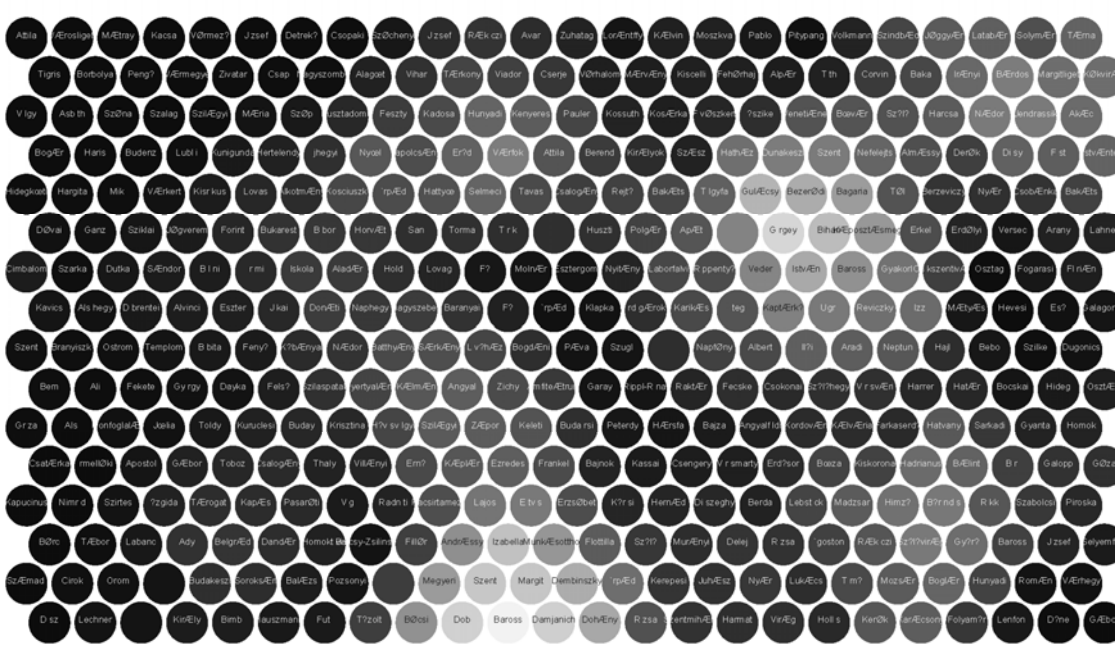
34



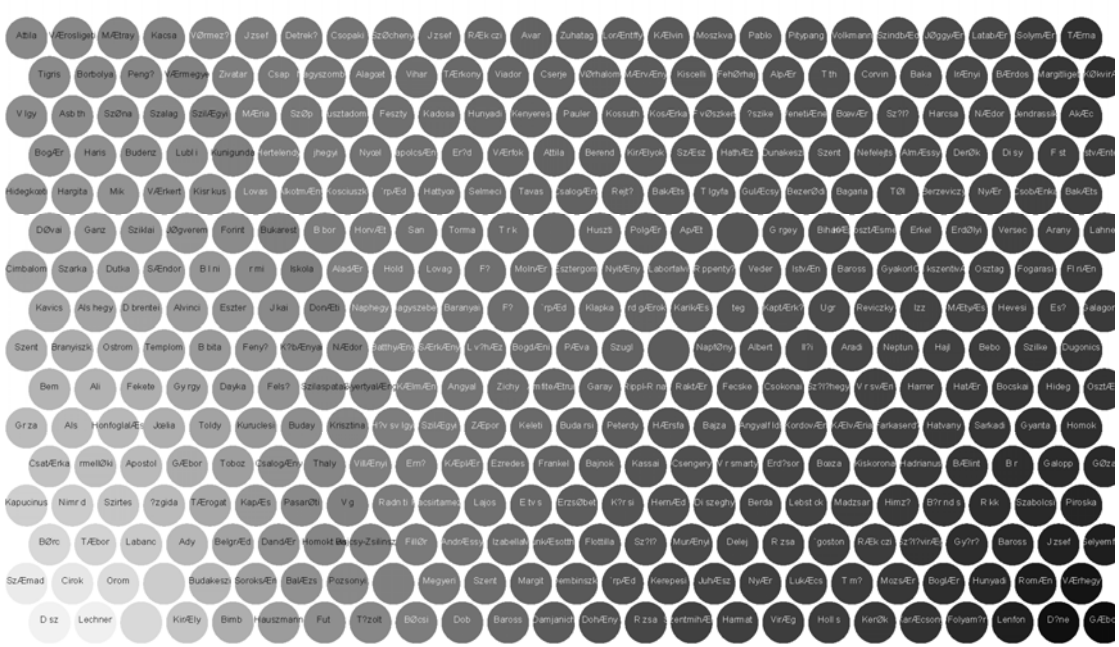
2005, Single-family prices



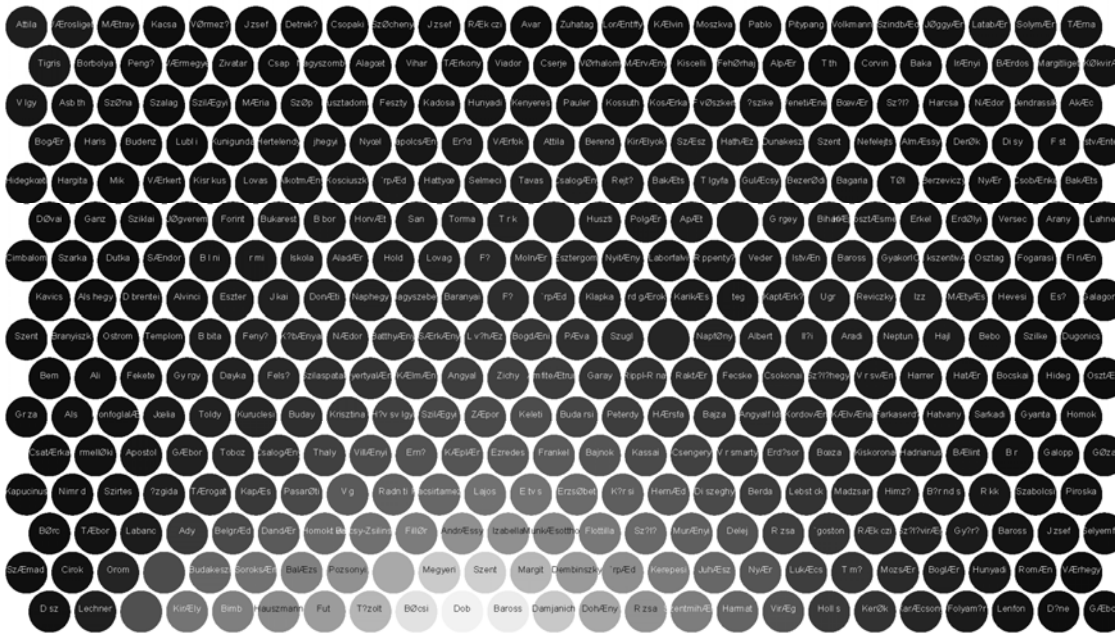
2005, Single-family volumes



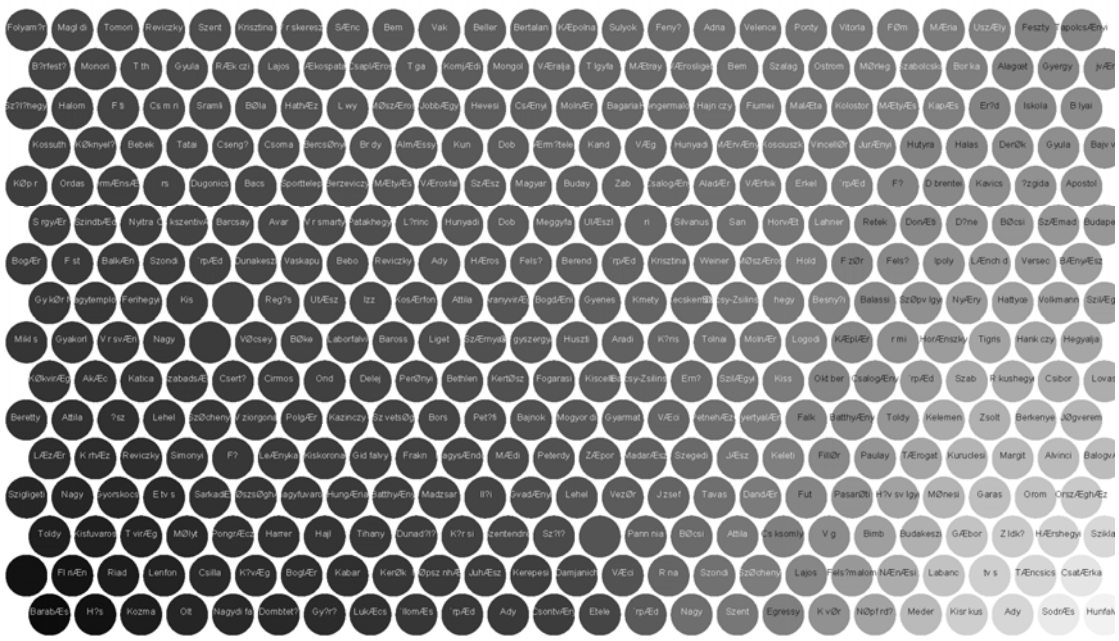
2005, Condo prices



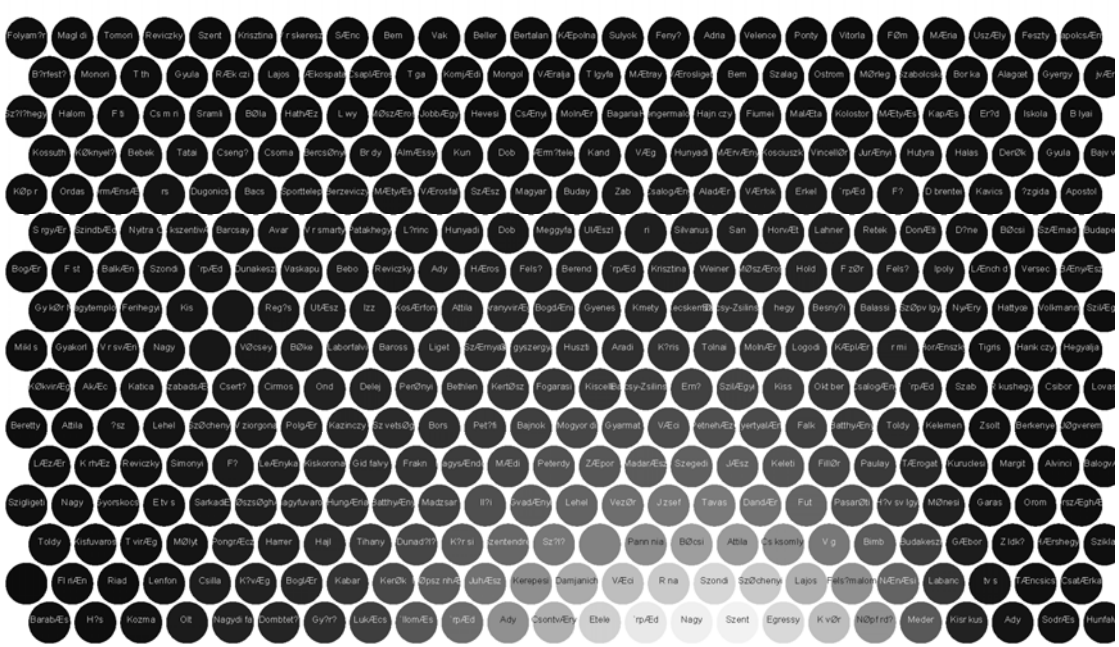
2005, Condo volumes



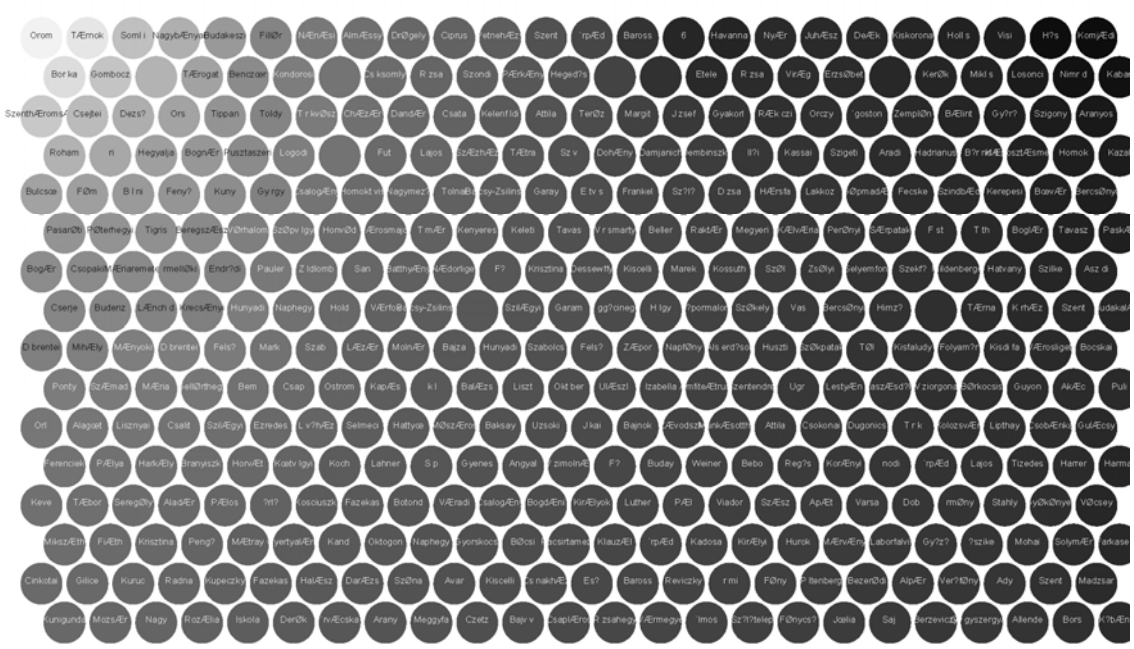
2006, Condo prices



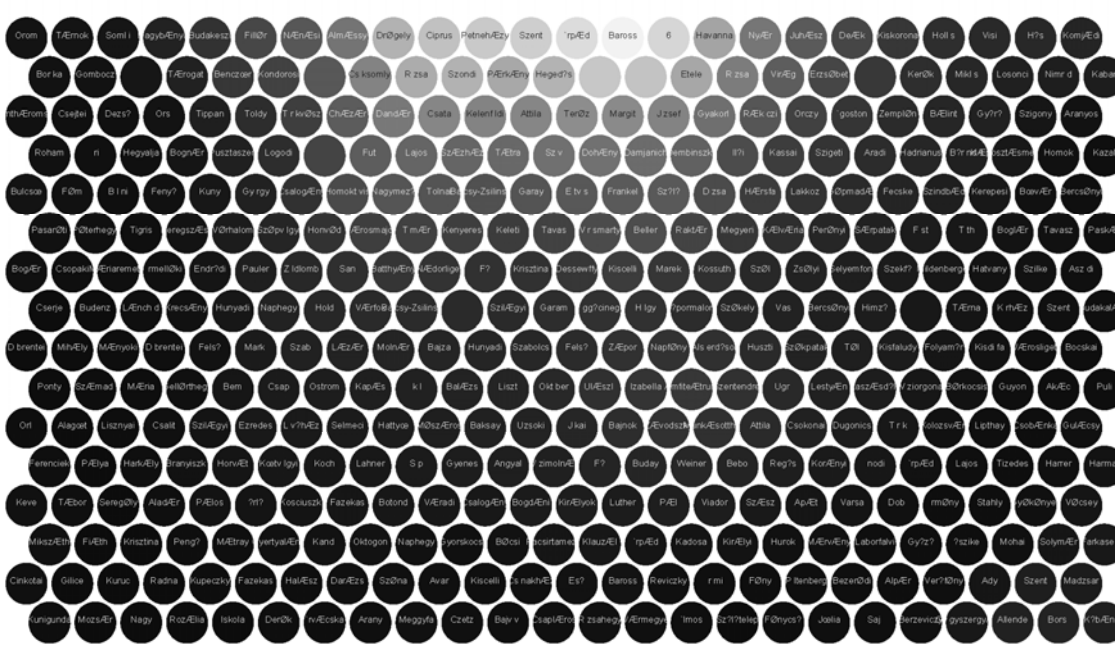
2006, Condo volumes



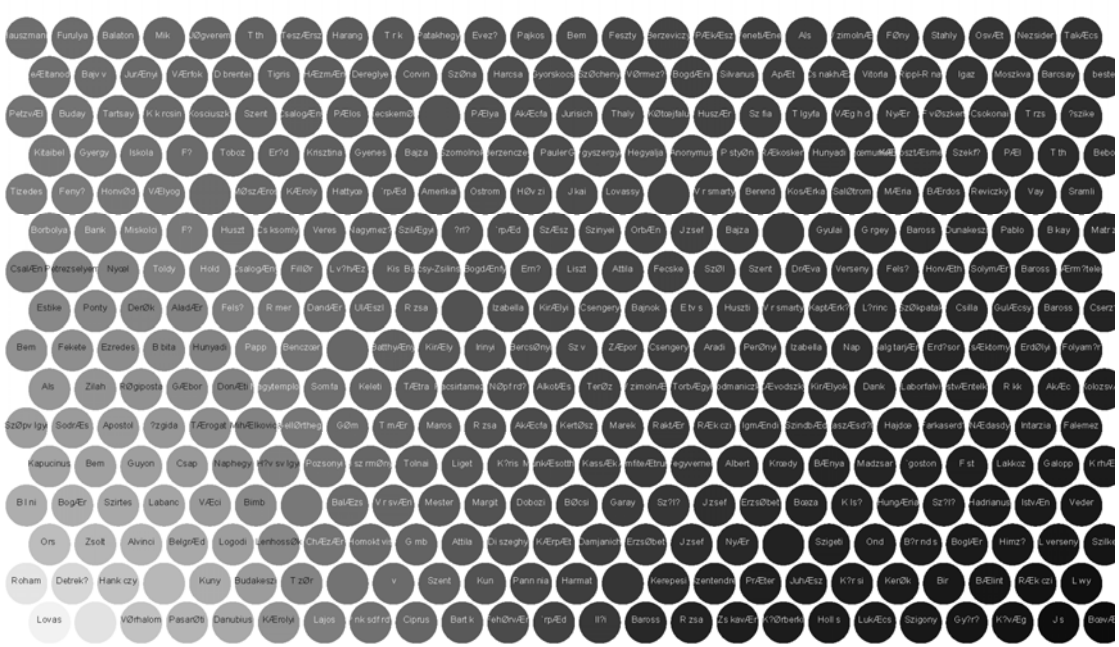
2007, Condo prices



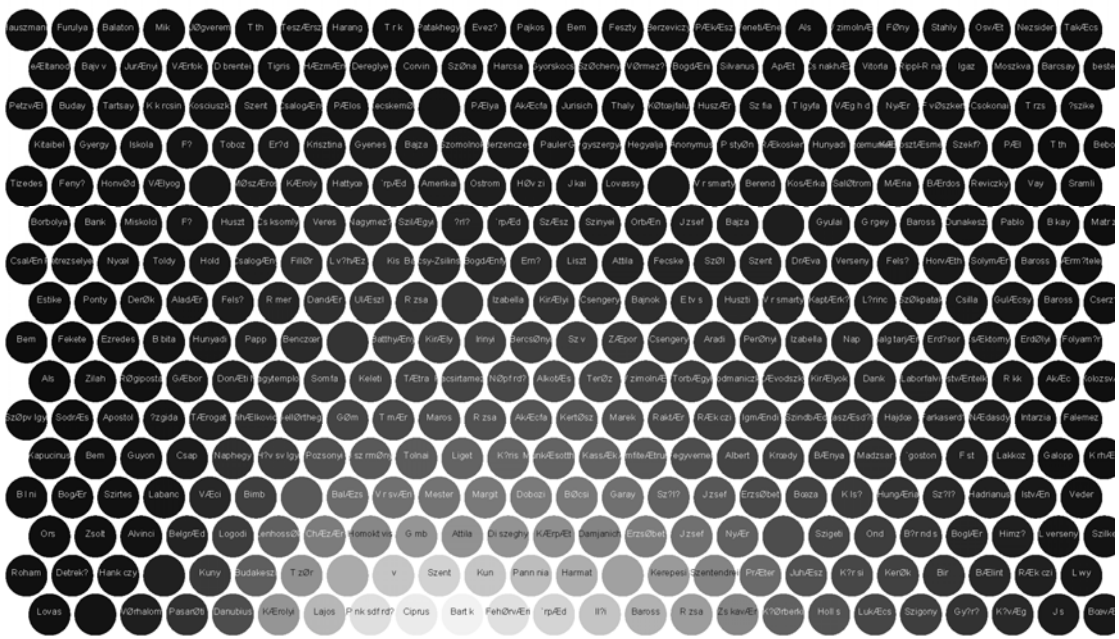
2007, Condo volumes



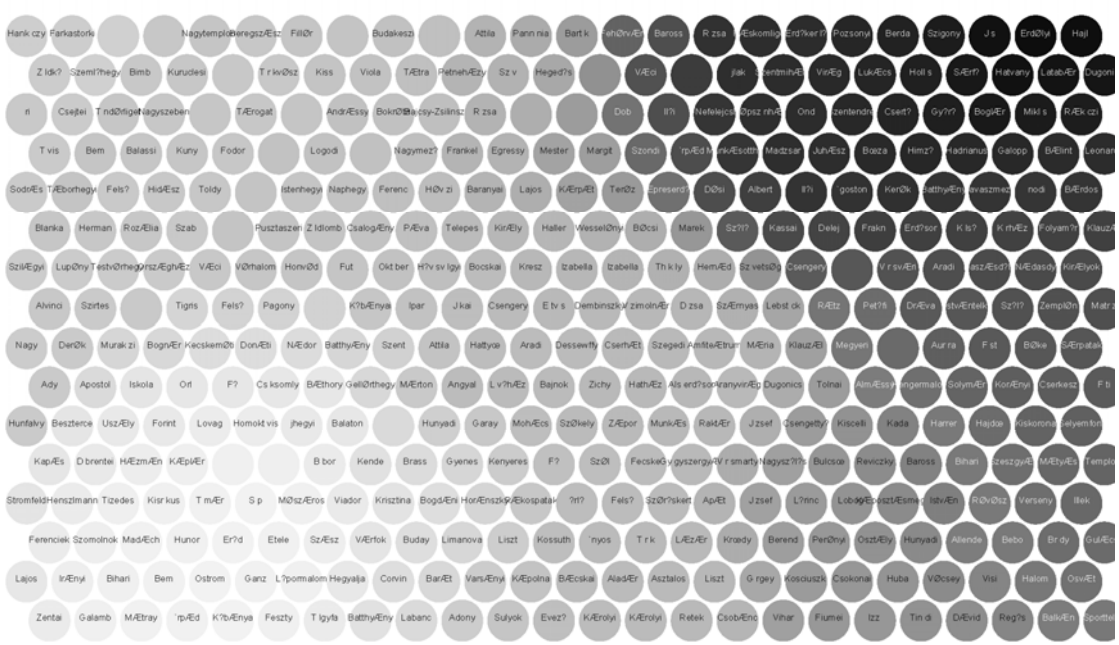
2008, Condo prices



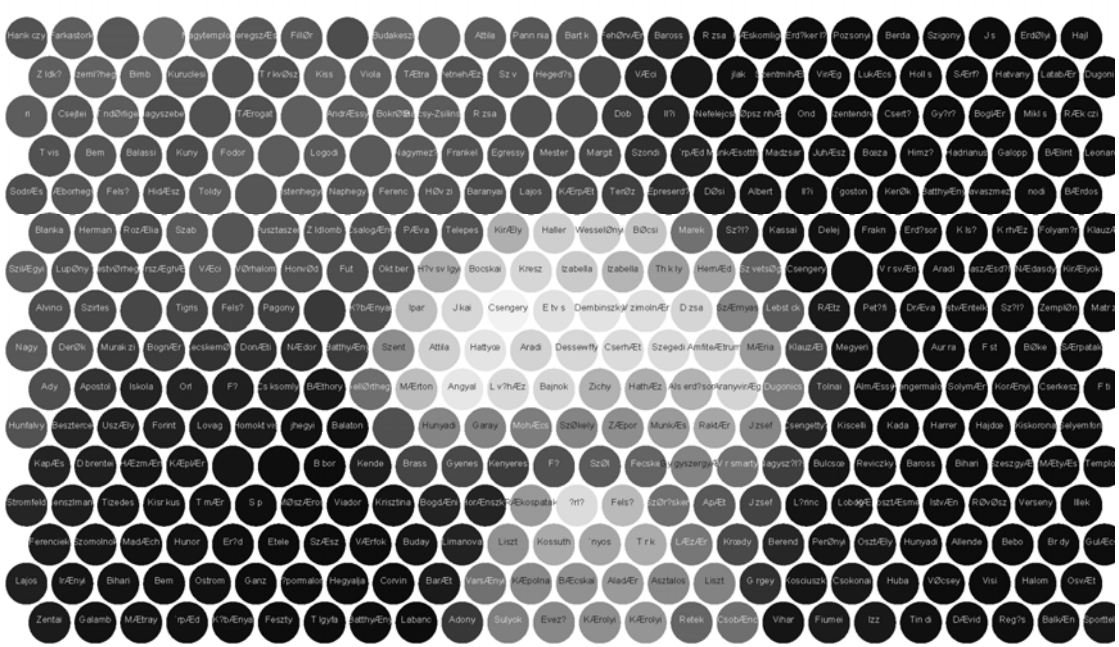
2008, Condo volumes



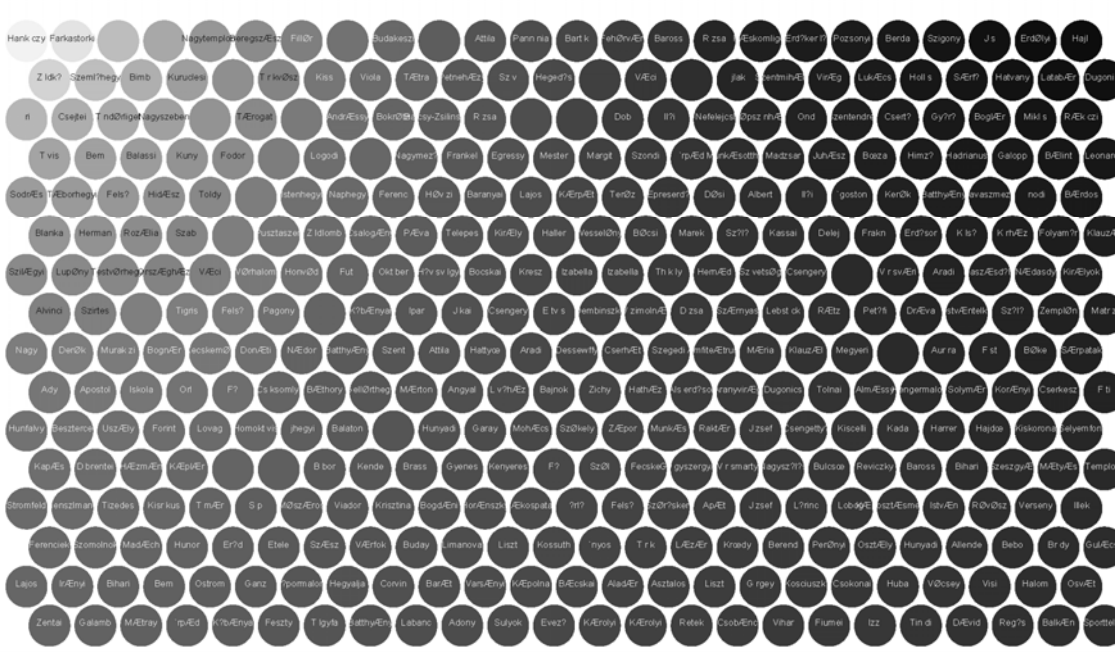
2009, Single-family prices



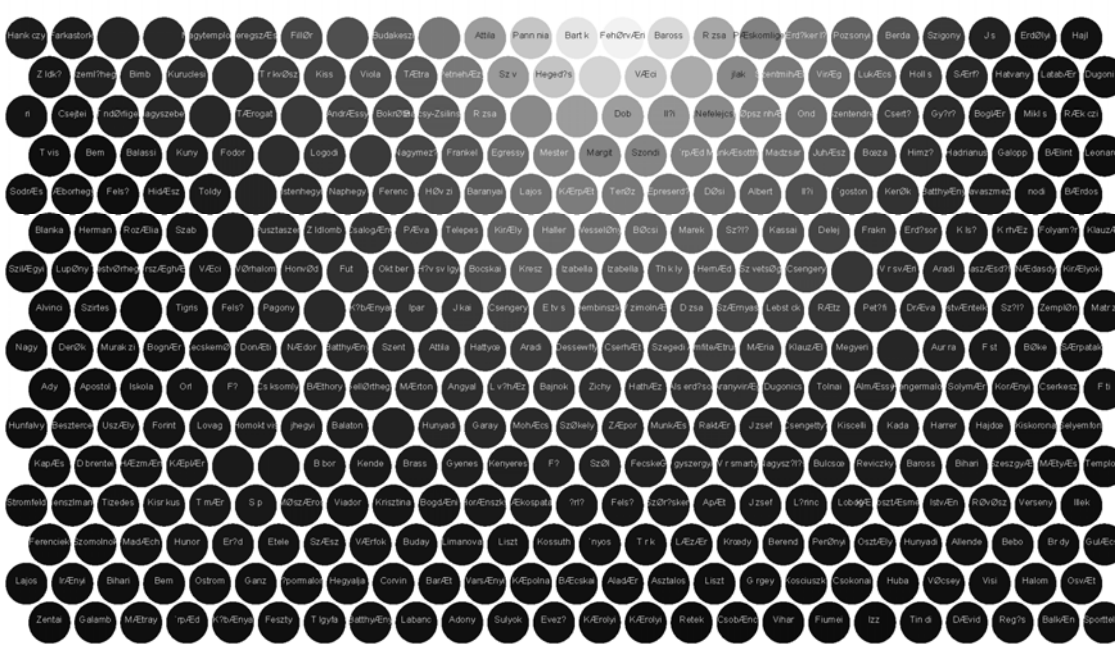
2009, Single-family volumes



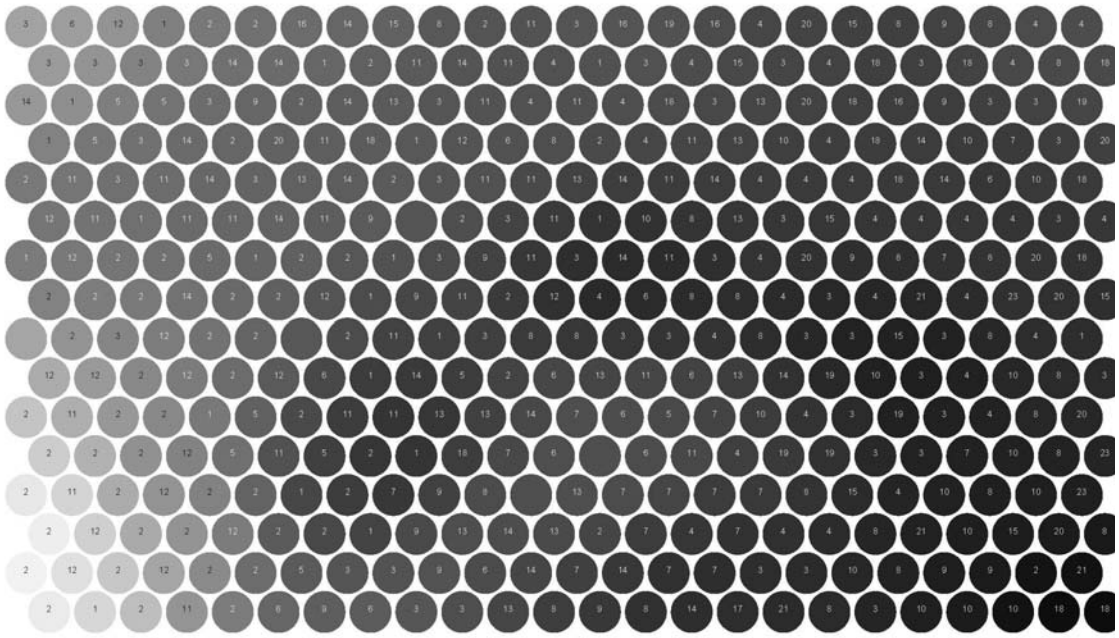
2009, Condo prices



2009, Condo volumes



2002, Single-family prices, with Budaőrs included



2003, Single-family prices, with Budaőrs included