A method has been developed for urbanization by using satellite data and socio-economic data. These datasets consists three decade Landsat images and population data. A detailed description using flow chart is given to show how to use this data to produce land use/cover maps. The land use/cover maps were used to know the urban growth in Samara City, Russia.

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Data source: Scientific Research Laboratory of Geo-informatics and Information Security (SRL-55), Samara State Aerospace University, Russia
Data accessibility: All data is in this data article

Value of the data

- Land use/cover data is utilized in maximum type of remote sensing data applications such as hydrology, agriculture, forest, urban growth, vulnerability, natural resources etc.
- Socio-economic or secondary data such as population data is useful to verify the satellite data and to know the growth of an area.
- Data of urban expansion, land use/cover is very useful to local government and urban planners for the future plans to sustainable development of the city.

1. **Data**

   Following multi-temporal and multi-spectral satellite data were used: Landsat 5 TM (Thematic Mapper) for 1985 and 1995, Landsat 7 ETM+ (Enhanced Thematic Mapper plus) for 2005 and Landsat 8 OLI (Operational Land Imager) for 2015, an image captured by a different type of sensor. All data were downloaded free of cost from NASA and USGS website. In secondary data we used population data of Samara city for last three decades.

2. **Experimental design, materials and methods**

   In methodological part all satellite data go through preprocessing, first use geometric correction, band ratio, than classification and in last change detection (Fig. 1). All four satellite images were

![Methodological flow chart](image)

**Fig. 1.** Methodological flow chart.
classified through maximum likelihood supervised classification in ArcGIS 10.1 software [1,2]. Also use secondary data such as field data and socio-economic/population data.

After preprocessing and classification, land use/cover change detection and a post-classification detection method was employed [3,4]. A pixel-based comparison was used to produce change information on pixel basis and thus, interpret the changes more efficiently taking the advantage of “-from, -to” information (Fig. 2). Classified image pairs of two different decade data were compared using cross-tabulation in order to determine qualitative and quantitative aspects of the changes for the period of 1985–2015. After classification, four major land cover classes were found: forest, built-up, water and grassland. A change matrix [5] was produced with the help of ArcGIS software. Quantitative areal data of the overall land use/cover changes as well as gains and losses in each category between 1985 and 2015 data were then compiled [6].

### 2.1. Urban expansion

Urban expansion rate and its dynamic change of the spatial structure of a city vary in a temporal sequence. The dynamism of land use class represents change in quantity of a certain land use class in a unit time [7], so this a key index for evaluating spatial change of urban expansion (Fig. 3). By analyzing the dynamism of land use, the extent and rate of urban expansion can be compared.

| Class   | Area  | %   |
|---------|-------|-----|
| BB      | 219.51| 11.18|
| BF      | 33.39 | 1.70 |
| BG      | 79.67 | 4.06 |
| BW      | 3.9   | 0.20 |
| FB      | 132.61| 6.75 |
| FF      | 388.63| 19.79|
| FG      | 141.56| 7.21 |
| FW      | 11.12 | 0.57 |
| GB      | 663.89| 33.81|
| GF      | 33.05 | 1.68 |
| GG      | 92.71 | 4.72 |
| GW      | 3.22  | 0.16 |
| WB      | 123.45| 6.29 |
| WF      | 11.88 | 0.61 |
| WG      | 12.64 | 0.64 |
| WW      | 12.15 | 0.62 |
| **Total** | **1963.38** | **100.00** |

![Legend](image)

![Fig. 2](image)
Fig. 3. City growth image data maps in different years from 1985 to 2015.
quantitatively [8], according to the following formula and produce urbanization data maps (Fig. 3):

\[ \text{LUDI} = \frac{U_a - U_b}{U_a} \times \frac{1}{T} \times 100\% \]  \hspace{1cm} (1)

where \( U_a \) and \( U_b \) denote areas of a certain land use class at time \( a \) and time \( b \) respectively; \( T \) denotes the length of time from time \( a \) to time \( b \). When \( T \) is in a unit of year, then LUDI is the annual rate of change in area for this land use class.

This data explores the spatial-temporal pattern of land use/cove change with applicability and effectiveness of satellite data with socio-economic data. This data show urban expansion with fast economic development of Samara city, Russia. Compiegne of satellite data with ground truth and population data shows similarity (Fig. 4). It is prove the accuracy of satellite data and its analysis work.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2016.01.056.

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