

MS Building Footprints 2018

Shapefile



Tags

buildings, Mississippi

Summary

Building footprint polygons of Mississippi structures. This data was generated from BING raster imagery by Microsoft. MDEQ Office of Geology downloaded and converted the Mississippi file from JSON format to a WGS84 shapefile using Mapshaper software. Next, MDEQ Office of Geology projected the shapefile into MSTM projection. Staff then added attributes : area in square feet, perimeter in feet, and county name. There are around 1,500,000 polygons in this layer. Next an Identity with county borders was run. A few polygons were across county lines. MDEQ made the call on which county to give the business to. MARIS received this shapefile from MDEQ and added metadata. Date on update is July 13,2018. *** MDEQ Office of Geology added elevation attribute in April 2019.

Description

MS building footprint polygons - 2018

******* See original source download and supplemental Information for details on data creation by Microsoft.**

<https://github.com/Microsoft/USBuildingFootprints>

Microsoft explanation: *"The gap areas contain image tiles taken with different cameras, which is causing the creation of artificial edges between neighboring tiles. These confuse our detection network which hasn't learned to deal with them. We took a very conservative approach of skipping such tiles. I think we could add additional effort to properly deal with this problem."*

Credits

Microsoft, BING, MDEQ-Office of Geology, MARIS

Use limitations

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Extent

West -91.689592 **East** -88.097778

North 35.005264 **South** 30.193016

Scale Range

Maximum (zoomed in) 1:5,000

Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata ►

Topics and Keywords ►

THEMES OR CATEGORIES OF THE RESOURCE location, planning Cadastre, society, structure

* CONTENT TYPE Downloadable Data

Hide Topics and Keywords ▲

Citation ►

TITLE MS Building Footprints 2018

PUBLICATION DATE 2018-07-10 00:00:00

PRESENTATION FORMATS * digital map

Hide Citation ▲

Citation Contacts ►

RESPONSIBLE PARTY

INDIVIDUAL'S NAME Steve Walker

ORGANIZATION'S NAME MARIS

CONTACT'S POSITION GIS Operations Manager

CONTACT'S ROLE distributor

CONTACT INFORMATION ►

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TYPE physical

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HOURS OF SERVICE
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Hide Contact information ▲

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CONTACT'S POSITION Division Director
CONTACT'S ROLE originator

CONTACT INFORMATION ►
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Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ►

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8-bit UCS Transfer Format

STATUS historical archive
SPATIAL REPRESENTATION TYPE * vector

SUPPLEMENTAL INFORMATION

***** MICROSOFT SUPPLEMENTAL INFORMATION

Introduction: This dataset originally contained 124,885,597 computer generated building footprints in all 50 US states. This data is freely available for download and use.

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Approximately 125 million building footprint polygon geometries in all 50 US States in GeoJSON format.

CREATION DETAILS

The building extraction is done in two stages:

- 1.Semantic Segmentation – Recognizing building pixels on the aerial image using DNNs
- 2.Polygonization – Converting building pixel blobs into polygons

FIRST STAGE - SEMANTIC SEGMENTATION

DNN architecture

The network foundation is ResNet34 which can be found here. In order to produce pixel prediction output, we have appended RefineNet upsampling layers described in this paper. The model is fully-convolutional, meaning that the model can be applied on an image of any size (constrained by GPU memory, 4096x4096 in our case).

Training details

The training set consists of 5 million labeled images. Majority of the satellite images cover diverse residential areas in US. For the sake of good set representation, we have enriched the set with samples from various areas covering mountains, glaciers, forests, deserts, beaches, coasts, etc. Images in the set are of 256x256 pixel size with 1 ft/pixel resolution. The training is done with CNTK toolkit using 32 GPUs.

Metrics

These are the intermediate stage metrics we use to track DNN model improvements and they are pixel based. The pixel error on the evaluation set is 1.15%. Pixel recall/precision = 94.5%/94.5%

SECOND STAGE - POLYGONIZATION

Method description

We developed a method that approximates the prediction pixels into polygons making decisions based on the whole prediction feature space. This is very different from standard approaches, e.g. Douglas-Peucker algorithm, which are greedy in nature. The method tries to impose some of a priori building properties, which are, at the moment, manually defined and automatically tuned. Some of these a priori properties are:

- 1.The building edge must be of at least some length, both relative and absolute, e.g. 3 meters
- 2.Consecutive edge angles are likely to be 90 degrees
- 3.Consecutive angles cannot be very sharp, smaller by some auto-tuned threshold, e.g. 30 degrees
- 4.Building angles likely have very few dominant angles, meaning all building edges are forming angle of (dominant angle \pm $\pi/2$)

In near future, we will be looking to deduce this automatically from existing building information.

Metrics

Building matching metrics:

METRIC	VALUE
Precision	99.3%
Recall	93.5%

We track various metrics to measure the quality of the output:

1. Intersection over Union – This is the standard metric measuring the overlap quality against the labels
2. Shape distance – With this metric we measure the polygon outline similarity
3. Dominant angle rotation error – This measures the polygon rotation deviation

On our evaluation set contains ~15k building. The metrics on the set are:

- IoU is 0.85, Shape distance is 0.33, Average rotation error is 1.6 degrees
- The metrics are better or similar compared to OSM building metrics against the labels

OTHER INFORMATION

Data Vintage: The vintage of the footprints depends on the vintage of the underlying imagery. Because Bing Imagery is a composite of multiple sources it is difficult to know the exact dates for individual pieces of data.

How good are the data? Our metrics show that in the vast majority of cases the quality is at least as good as data hand digitized buildings in OpenStreetMap. It is not perfect, particularly in dense urban areas but it is still awesome.

What is the coordinate reference system? EPSG: 4326

Will Microsoft be open sourcing the models? Yes. We are working through the internal process to open source the segmentation models and polygonization algorithms.

Will there be more data coming for other geographies? Maybe. This is a work in progress.

Why are the data being released? Microsoft has a continued interest in supporting a thriving OpenStreetMap ecosystem.

Should we import the data in to OpenStreetMap? Maybe. Never overwrite the hard work of other contributors or blindly import data in to OSM without first checking the local quality. While our metrics show that this data meets or exceeds the quality of hand drawn building footprints, the Data does vary in quality from place to place, between rural and urban, mountains and plains, and so on. Inspect quality locally and discuss an import plan with the community. Always follow the OSM import community guidelines.

State	Number of Buildings	Unzipped MB
Mississippi	1,470,285	438.99

CONTRIBUTING:

This project welcomes contributions and suggestions. Most contributions require you to agree to a Contributor License Agreement (CLA) declaring that you have the right to, and actually do, grant us the rights to use your contribution. For details, visit <https://cla.microsoft.com>.

When you submit a pull request, a CLA-bot will automatically determine whether you need to provide a CLA and decorate the PR appropriately (e.g., label, comment). Simply follow the instructions provided by the bot. You will only need to do this once across all repos using our CLA.

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* **PROCESSING ENVIRONMENT** Version 6.2 (Build 9200) ; Esri ArcGIS 10.6.1.9270

CREDITS

Microsoft, BING, MDEQ-Office of Geology, MARIS

ARCGIS ITEM PROPERTIES

- * **NAME** MS_BldgFootp_2018
- * **SIZE** 216.357
- * **LOCATION** file:///\\DESKTOP-TP9LNVL\F\$\DATA\00_CADASTRAL\MS_BldgFootp_2018.shp
- * **ACCESS PROTOCOL** Local Area Network

[Hide Resource Details ▲](#)

Extents ►

EXTENT

GEOGRAPHIC EXTENT

BOUNDING RECTANGLE

EXTENT TYPE Extent used for searching

- * **WEST LONGITUDE** -91.689592
- * **EAST LONGITUDE** -88.097778
- * **NORTH LATITUDE** 35.005264

- * SOUTH LATITUDE 30.193016
- * EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM

- * WEST LONGITUDE 322933.932500
- * EAST LONGITUDE 650821.417100
- * SOUTH LATITUDE 1045683.891200
- * NORTH LATITUDE 1577832.591700
- * EXTENT CONTAINS THE RESOURCE Yes

[Hide Extents ▲](#)

Resource Maintenance ►

RESOURCE MAINTENANCE

UPDATE FREQUENCY as needed

[Hide Resource Maintenance ▲](#)

Resource Constraints ►

CONSTRAINTS

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[Hide Resource Constraints ▲](#)

Spatial Reference ►

ARCGIS COORDINATE SYSTEM

- * TYPE Projected
 - * GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
 - * PROJECTION NAD_1983_Mississippi_TM
 - * COORDINATE REFERENCE DETAILS
- PROJECTED COORDINATE SYSTEM
- WELL-KNOWN IDENTIFIER 102609

X ORIGIN -5122200
Y ORIGIN -12297100
XY SCALE 450339697.45066422
Z ORIGIN -100000
Z SCALE 10000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.001
Z TOLERANCE 0.001
M TOLERANCE 0.001
HIGH PRECISION true
LATEST WELL-KNOWN IDENTIFIER 3814
WELL-KNOWN TEXT
PROJCS["NAD_1983_Mississippi_TM",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northing",1300000.0],PARAMETER["Central_Meridian",-89.75],PARAMETER["Scale_Factor",0.9998335],PARAMETER["Latitude_Of_Origin",32.5],UNIT["Meter",1.0],AUTHORITY["EPSG",3814]]

REFERENCE SYSTEM IDENTIFIER

- * VALUE 3814
- * CODESPACE EPSG
- * VERSION 6.17.1(10.0.0)

[Hide Spatial Reference ▲](#)

Spatial Data Properties ►

VECTOR ►

- * LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS

- FEATURE CLASS NAME MS_BldgFootp_2018
- * OBJECT TYPE composite
 - * OBJECT COUNT 1496676

[Hide Vector ▲](#)

ARCgis FEATURE CLASS PROPERTIES ►

- FEATURE CLASS NAME MS_BldgFootp_2018
- * FEATURE TYPE Simple
 - * GEOMETRY TYPE Polygon
 - * HAS TOPOLOGY FALSE
 - * FEATURE COUNT 1496676
 - * SPATIAL INDEX TRUE
 - * LINEAR REFERENCING FALSE

[Hide ArcGIS Feature Class Properties ▲](#)

[Hide Spatial Data Properties ▲](#)

Geoprocessing history ►

PROCESS

PROCESS NAME

DATE 2019-03-07 16:02:44

TOOL LOCATION c:\program files (x86)\arcgis\desktop10.6\ArcToolbox\Toolboxes\Analysis Tools.tbx\Identity

COMMAND ISSUED

```
Identity D:\WorkspaceD\Mississippihpbl\MS_Bldproject.shp
D:\WorkspaceD\Mississippihpbl\stcol00buffdissolve2.shp
D:\WorkspaceD\Mississippihpbl\MS_Bldproject_Identity2.shp NO_FID #
NO_RELATIONSHIPS
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS

PROCESS NAME

DATE 2019-03-08 09:58:46

TOOL LOCATION c:\program files (x86)\arcgis\desktop10.6\ArcToolbox\Toolboxes\Data Management Tools.tbx>DeleteField

COMMAND ISSUED

```
DeleteField D:\WorkspaceD\Mississippi71318\MS_7-13-
2018bldfootprint.gdb\MS_Bldfootprint FID_1;POLY_AREA;PERIMETER
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS

PROCESS NAME

DATE 2019-03-08 10:06:57

TOOL LOCATION c:\program files (x86)\arcgis\desktop10.6\ArcToolbox\Toolboxes\Data Management Tools.tbx>DeleteField

COMMAND ISSUED

```
DeleteField D:\WorkspaceD\Mississippi71318\MS_7-13-
2018bldfootprint.gdb\MS_Bldfootprint FID_1;POLY_AREA;PERIMETER
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS

PROCESS NAME

DATE 2019-03-08 10:07:16

TOOL LOCATION c:\program files (x86)\arcgis\desktop10.6\ArcToolbox\Toolboxes\Data Management Tools.tbx>DeleteField

COMMAND ISSUED

```
DeleteField D:\WorkspaceD\Mississippi71318\MS_7-13-
2018bldfootprint.gdb\MS_Bldfootprint FID_1
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS

PROCESS NAME

DATE 2019-04-16 11:12:20

TOOL LOCATION c:\program files (x86)\arcgis\desktop10.6\ArcToolbox\Toolboxes\Analysis Tools.tbx\SpatialJoin

COMMAND ISSUED

```
SpatialJoin MS_Bldfootprint MS_Bldfootprint
F:\DATA\00_CADASTRAL\MS_BldgFootp_2018.shp JOIN_ONE_TO_ONE KEEP_ALL "FID_1
"FID_1" true true false 4 Long 0 0 ,First,#,MS_Bldfootprint,FID_1,-1,-
1;POLY_AREA "POLY_AREA" true true false 8 Double 0 0
,First,#,MS_Bldfootprint,POLY_AREA,-1,-1;PERIMETER "PERIMETER" true true
false 8 Double 0 0 ,First,#,MS_Bldfootprint,PERIMETER,-1,-1;CONAME "CONAME"
true true false 15 Text 0 0 ,First,#,MS_Bldfootprint,CONAME,-1,-
1;Shape_Length "Shape_Length" false true true 8 Double 0 0
```

```
,First,#,MS_Bldfootprint,Shape_Length,-1,-1;Shape_Area "Shape_Area" false
true true 8 Double 0 0 ,First,#,MS_Bldfootprint,Shape_Area,-1,-1;FID_12
"FID_12" true true false 4 Long 0 0 ,First,#,MS_Bldfootprint,FID_1,-1,-
1;POLY_AREA_1 "POLY_AREA_1" true true false 8 Double 0 0
,First,#,MS_Bldfootprint,POLY_AREA,-1,-1;PERIMETER_1 "PERIMETER_1" true true
false 8 Double 0 0 ,First,#,MS_Bldfootprint,PERIMETER,-1,-1;CONAME_1
"CONAME_1" true true false 15 Text 0 0 ,First,#,MS_Bldfootprint,CONAME,-1,-
1;ORIG_FID "ORIG_FID" true true false 4 Long 0 0
,First,#,MS_Bldfootprint,ORIG_FID,-1,-1;Z "Z" true true false 8 Double 0 0
,First,#,MS_Bldfootprint,Z,-1,-1" INTERSECT # #
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

[Hide Geoprocessing history ▲](#)

Distribution ►

DISTRIBUTION FORMAT

* NAME Shapefile

TRANSFER OPTIONS

UNITS OF DISTRIBUTION meters

* TRANSFER SIZE 216.357

[Hide Distribution ▲](#)

Fields ►

DETAILS FOR OBJECT [MS_BldgFootp_2018 ►](#)

* TYPE Feature Class

* ROW COUNT 1496676

DEFINITION

Building footprint polygons for Mississippi

DEFINITION SOURCE

MARIS

FIELD FID ►

* ALIAS FID

* DATA TYPE OID

* WIDTH 4

* PRECISION 0

* SCALE 0

* FIELD DESCRIPTION

Internal feature number.

* DESCRIPTION SOURCE

Esri

* DESCRIPTION OF VALUES

Sequential unique whole numbers that are automatically generated.

[Hide Field FID ▲](#)

FIELD Shape ▶

- * ALIAS Shape
- * DATA TYPE Geometry
- * WIDTH 0
- * PRECISION 0
- * SCALE 0
- * FIELD DESCRIPTION
Feature geometry.

- * DESCRIPTION SOURCE
Esri

- * DESCRIPTION OF VALUES
Coordinates defining the features.

[Hide Field Shape ▲](#)

FIELD TARGET_FID ▶

- * ALIAS TARGET_FID
- * DATA TYPE Integer
- * WIDTH 10
- * PRECISION 10
- * SCALE 0

[Hide Field TARGET_FID ▲](#)

FIELD FID_1 ▶

- * ALIAS FID_1
- * DATA TYPE Integer
- * WIDTH 10
- * PRECISION 10
- * SCALE 0
- FIELD DESCRIPTION
ESRI ID

DESCRIPTION SOURCE
ESRI

DESCRIPTION OF VALUES
none

[Hide Field FID_1 ▲](#)

FIELD POLY_AREA ►

- * ALIAS POLY_AREA
- * DATA TYPE Double
- * WIDTH 19
- * PRECISION 0
- * SCALE 0

Hide Field POLY_AREA ▲

FIELD PERIMETER ►

- * ALIAS PERIMETER
- * DATA TYPE Double
- * WIDTH 19
- * PRECISION 0
- * SCALE 0

Hide Field PERIMETER ▲

FIELD CONAME ►

- * ALIAS CONAME
- * DATA TYPE String
- * WIDTH 15
- * PRECISION 0
- * SCALE 0

FIELD DESCRIPTION
County name

DESCRIPTION SOURCE
MARIS

DESCRIPTION OF VALUES
name

Hide Field CONAME ▲

FIELD Shape_Leng ►

- * ALIAS Shape_Leng
- * DATA TYPE Double
- * WIDTH 19
- * PRECISION 0
- * SCALE 0

Hide Field Shape_Leng ▲

FIELD Shape_Area ▶

- * ALIAS Shape_Area
- * DATA TYPE Double
- * WIDTH 19
- * PRECISION 0
- * SCALE 0
- * FIELD DESCRIPTION
Area of feature in internal units squared.
- * DESCRIPTION SOURCE
Esri
- * DESCRIPTION OF VALUES
Positive real numbers that are automatically generated.

Hide Field Shape_Area ▲

FIELD ORIG_FID ▶

- * ALIAS ORIG_FID
- * DATA TYPE Integer
- * WIDTH 10
- * PRECISION 10
- * SCALE 0

Hide Field ORIG_FID ▲

FIELD Z ▶

- * ALIAS Z
- * DATA TYPE Double
- * WIDTH 19
- * PRECISION 0
- * SCALE 0
- FIELD DESCRIPTION
Elevation in Feet
- DESCRIPTION SOURCE
MDEQ Office of Geology

Hide Field Z ▲

Hide Details for object MS_BldgFootp_2018 ▲

Hide Fields ▲

Metadata Details ▶

* METADATA LANGUAGE English (UNITED STATES)

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset

SCOPE NAME * dataset

* LAST UPDATE 2019-04-16

ARCGIS METADATA PROPERTIES

METADATA FORMAT ArcGIS 1.0

METADATA STYLE FGDC CSDGM Metadata

STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2019-03-07 15:50:54

LAST MODIFIED IN ARCGIS FOR THE ITEM 2019-04-16 12:52:39

AUTOMATIC UPDATES

HAVE BEEN PERFORMED Yes

LAST UPDATE 2019-04-16 12:51:47

[Hide Metadata Details ▲](#)

Metadata Contacts ►

METADATA CONTACT

INDIVIDUAL'S NAME Steve Walker

ORGANIZATION'S NAME MARIS

CONTACT'S POSITION GIS Operations Manager

CONTACT'S ROLE originator

CONTACT INFORMATION ►

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E-MAIL ADDRESS swalker@mississippi.edu

HOURS OF SERVICE

M-f 7-3 CDT

[Hide Contact information ▲](#)

[Hide Metadata Contacts ▲](#)

Metadata Maintenance ►

MAINTENANCE

UPDATE FREQUENCY as needed

[Hide Metadata Maintenance ▲](#)

Thumbnail and Enclosures ►

THUMBNAIL

THUMBNAIL TYPE JPG

[Hide Thumbnail and Enclosures ▲](#)

FGDC Metadata (read-only) ▼

DETAILED DESCRIPTION

ENTITY TYPE

ENTITY TYPE LABEL MS_BldgFootp_2018

ENTITY TYPE DEFINITION

Building footprint polygons for Mississippi

ENTITY TYPE DEFINITION SOURCE MARIS

ATTRIBUTE

ATTRIBUTE LABEL FID

ATTRIBUTE DEFINITION

Internal feature number.

ATTRIBUTE DEFINITION SOURCE Esri

ATTRIBUTE DOMAIN VALUES

UNREPRESENTABLE DOMAIN

Sequential unique whole numbers that are automatically generated.

ATTRIBUTE

ATTRIBUTE LABEL Shape

ATTRIBUTE DEFINITION

Feature geometry.

ATTRIBUTE DEFINITION SOURCE Esri

ATTRIBUTE DOMAIN VALUES

UNREPRESENTABLE DOMAIN

Coordinates defining the features.

ATTRIBUTE

ATTRIBUTE LABEL TARGET_FID

ATTRIBUTE

ATTRIBUTE LABEL FID_1

ATTRIBUTE DEFINITION

ESRI ID

ATTRIBUTE DEFINITION SOURCE ESRI

ATTRIBUTE DOMAIN VALUES

UNREPRESENTABLE DOMAIN

none

ATTRIBUTE

ATTRIBUTE LABEL POLY_AREA

ATTRIBUTE

ATTRIBUTE LABEL PERIMETER

ATTRIBUTE

ATTRIBUTE LABEL CONAME

ATTRIBUTE DEFINITION

County name

ATTRIBUTE DEFINITION SOURCE MARIS

ATTRIBUTE DOMAIN VALUES

UNREPRESENTABLE DOMAIN

name

ATTRIBUTE

ATTRIBUTE LABEL Shape_Leng

ATTRIBUTE

ATTRIBUTE LABEL Shape_Area

ATTRIBUTE DEFINITION

Area of feature in internal units squared.

ATTRIBUTE DEFINITION SOURCE Esri

ATTRIBUTE DOMAIN VALUES

UNREPRESENTABLE DOMAIN

Positive real numbers that are automatically generated.

ATTRIBUTE

ATTRIBUTE LABEL ORIG_FID

ATTRIBUTE

ATTRIBUTE LABEL Z

ATTRIBUTE DEFINITION

Elevation in Feet

ATTRIBUTE DEFINITION SOURCE MDEQ Office of Geology

[Hide Entities and Attributes ▲](#)