27/11/2022

# ML4EARTH HACKATHON 2022

# CROP YIELDS PREDICTION

## WITH REMOTE SENSING AND MACHINE LEARNING AND EXPLORING RELATIONS WITH EXPLAINABLE AI

# TEAM MEMBER

PARINDA PANNOON

YANIKA DONTONG

LISAH LIGONO

# 1.DATA PREPROCESSING

## FEATURES

Format: YYYYMMDD_FEATURE

| | 20030101_RED | 20030101_NIR | 20030101_BLUE | 20030101_GREEN | 20030101_NIR2 | 20030101_SWIR1 | 20030101_SWIR2 | 20030101_TEMP_MIN | 20030101_TEMP_MAX | 20030101_PRCP |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.018605 | 0.150139 | 0.005622 | 0.016483 | 0.316955 | 0.448997 | 0.325633 | 0.936600 | 0.667767 | 0.988659 |
| 1 | 0.017122 | 0.087652 | 0.009498 | 0.012267 | 0.204189 | 0.400998 | 0.305396 | 0.882022 | 0.586186 | 0.590872 |
| 2 | 0.005642 | 0.109589 | 0.000428 | 0.002199 | 0.245223 | 0.386665 | 0.283037 | 0.927178 | 0.611135 | 0.826099 |
| 3 | 0.069652 | 0.112997 | 0.031000 | 0.038047 | 0.380743 | 0.746962 | 0.714260 | 0.279964 | 0.555990 | 0.000000 |

## LABELS

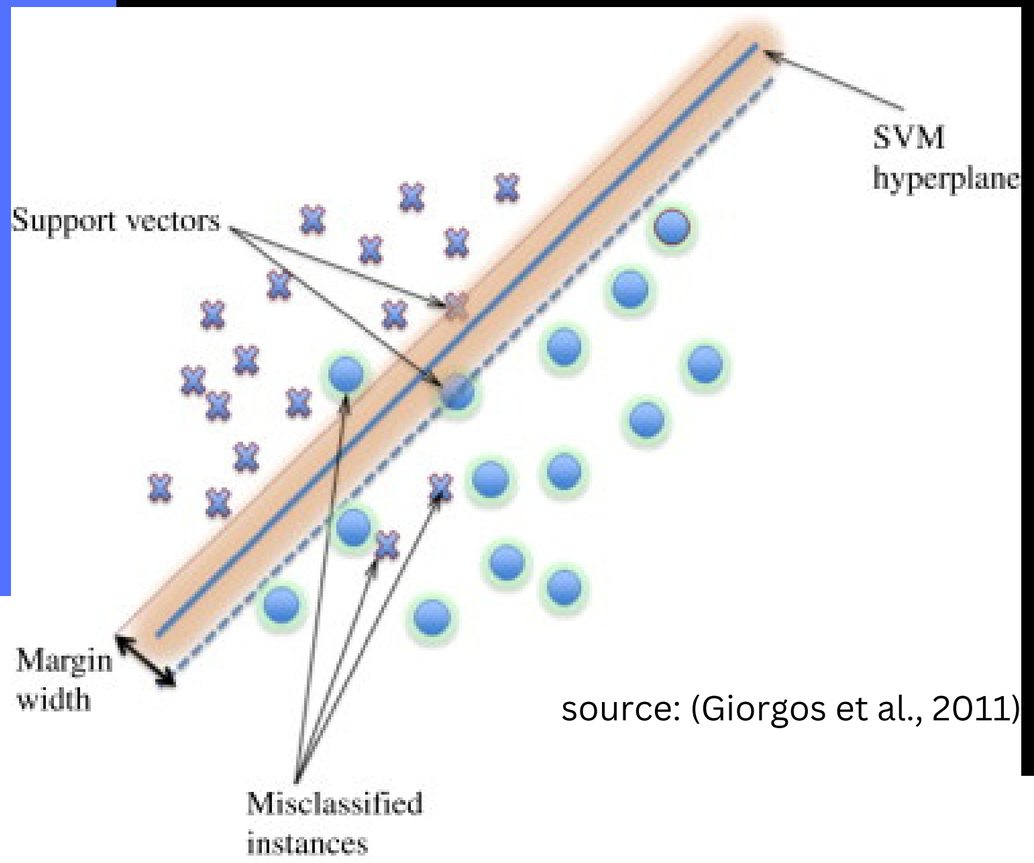
```
array([67.4, 54.8, 58.7, 53.8, 64.8])
```

Array of yield

# 1.DATA PREPROCESSING

# 2.METHOD:

## SVM MODEL
## SUPPORT VECTOR REGRESSION (SVR)



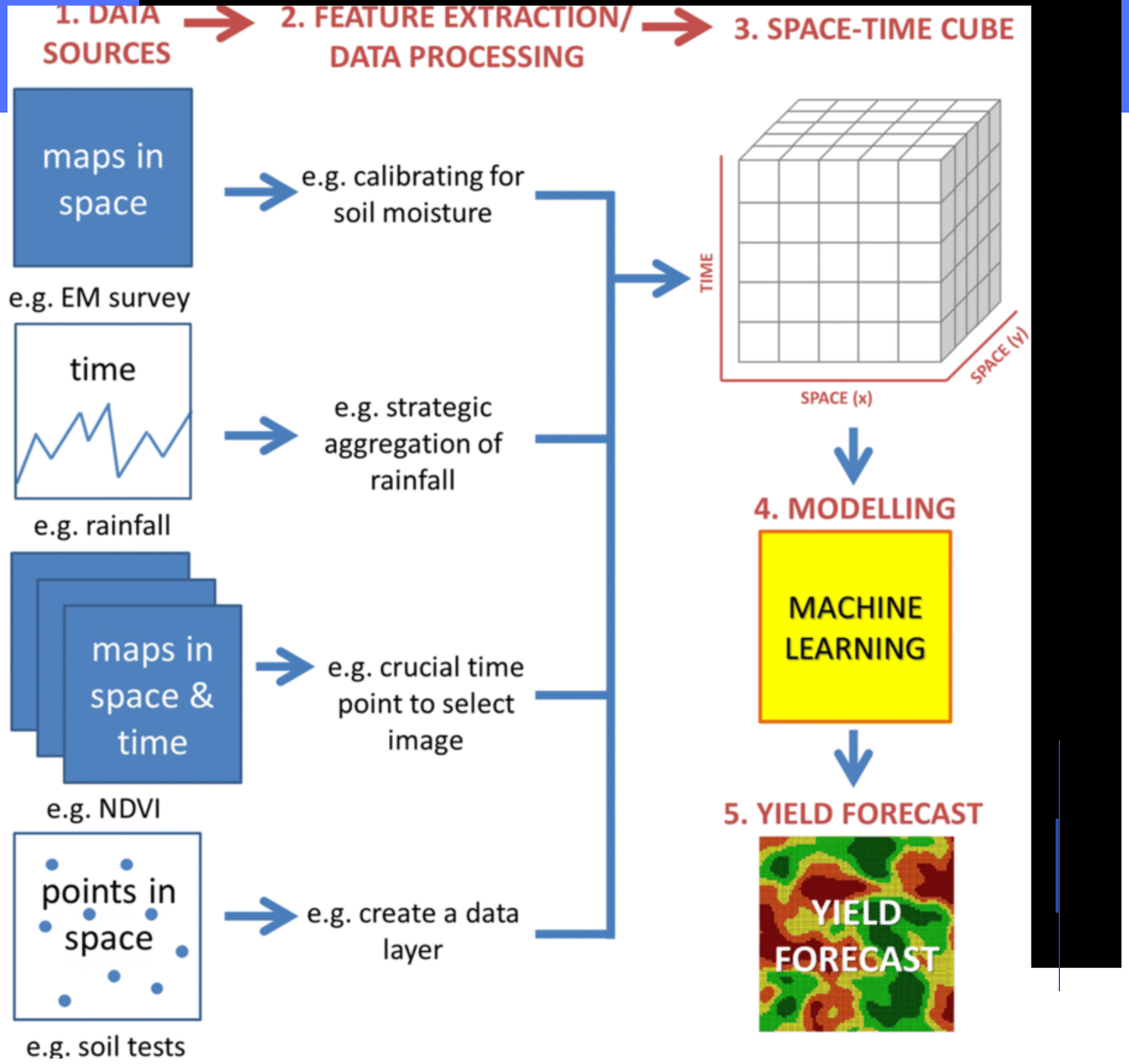

source: (Giorgos et al., 2011)

*SVR gives us the flexibility to define how much error is acceptable in our model and will find an appropriate line (or hyperplane in higher dimensions) to fit the data.*

# 2.METHOD:

## SVM MODEL
## SUPPORT VECTOR REGRESSION (SVR)

Graphic representation of crop yield estimation using SVM and MODIS



# 3.RESULTS:

## CORN YEILDS PREDICTION

```
R^2 score 2003 in the test set is 0.252538704533040 84
R^2 score 2004 in the test set is 0.4399606685403773
R^2 score 2005 in the test set is 0.3639270935321541 3
R^2 score 2006 in the test set is 0.2796112536178856 4
R^2 score 2007 in the test set is 0.4970293197339778
R^2 score 2008 in the test set is 0.4374009540723689
R^2 score 2009 in the test set is 0.4609573291351617 4
R^2 score 2010 in the test set is 0.3068302600663893 6
R^2 score 2011 in the test set is 0.4527002493727803
R^2 score 2012 in the test set is 0.5583226990045014
R^2 score 2013 in the test set is 0.3106456134924551
R^2 score 2014 in the test set is 0.4044881986589816 7
R^2 score 2015 in the test set is 0.3792892243664609 5
R^2 score 2016 in the test set is 0.5590566297212245
R^2 score 2017 in the test set is 0.4144858933999518
R^2 score 2018 in the test set is 0.3183793317710676
R^2 score 2019 in the test set is 0.4395105137045709 5
R^2 score 2020 in the test set is 0.2586425886429482
R^2 score 2021 in the test set is 0.3223943098286141 7
```

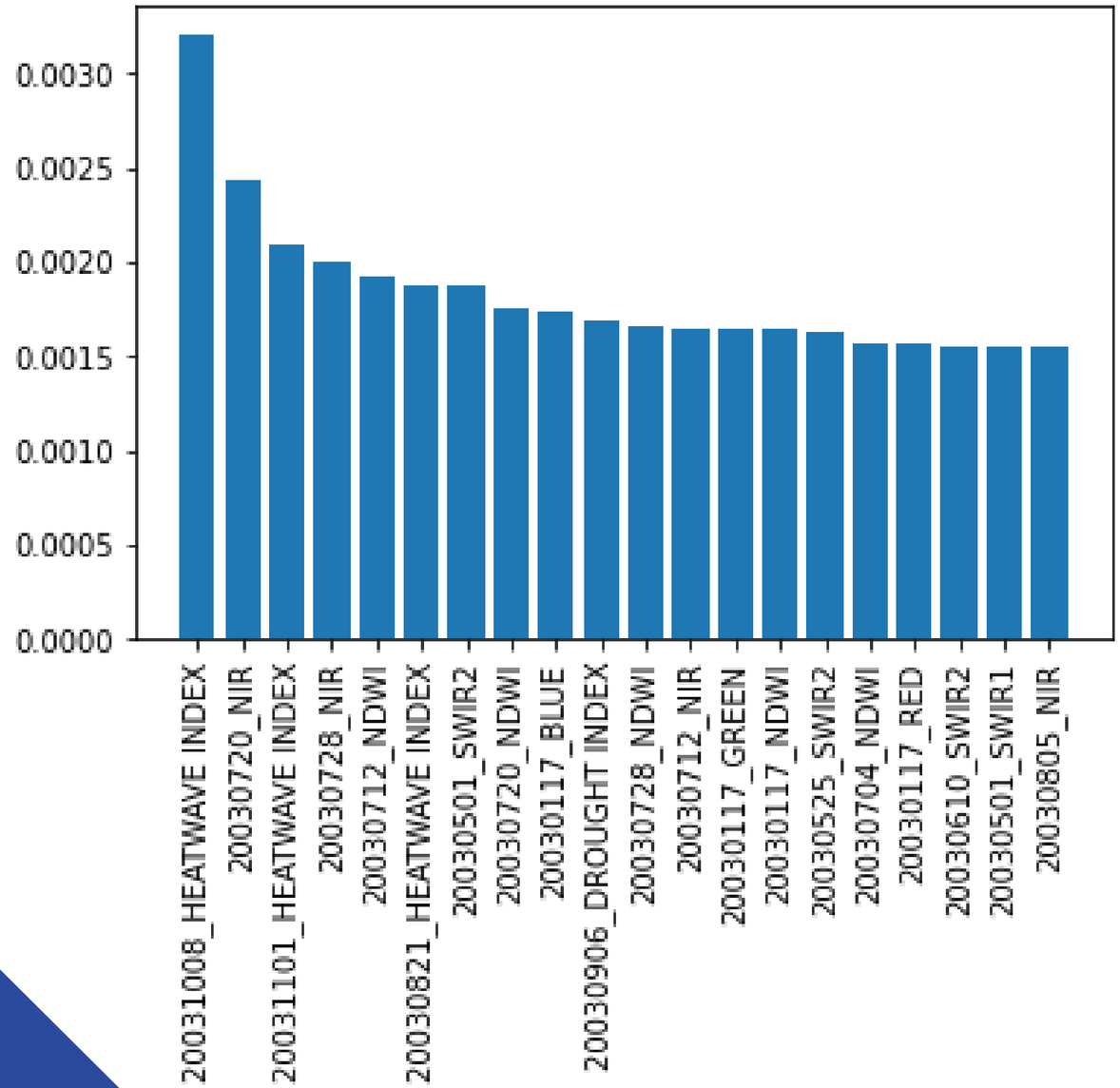
2003: 0.25253

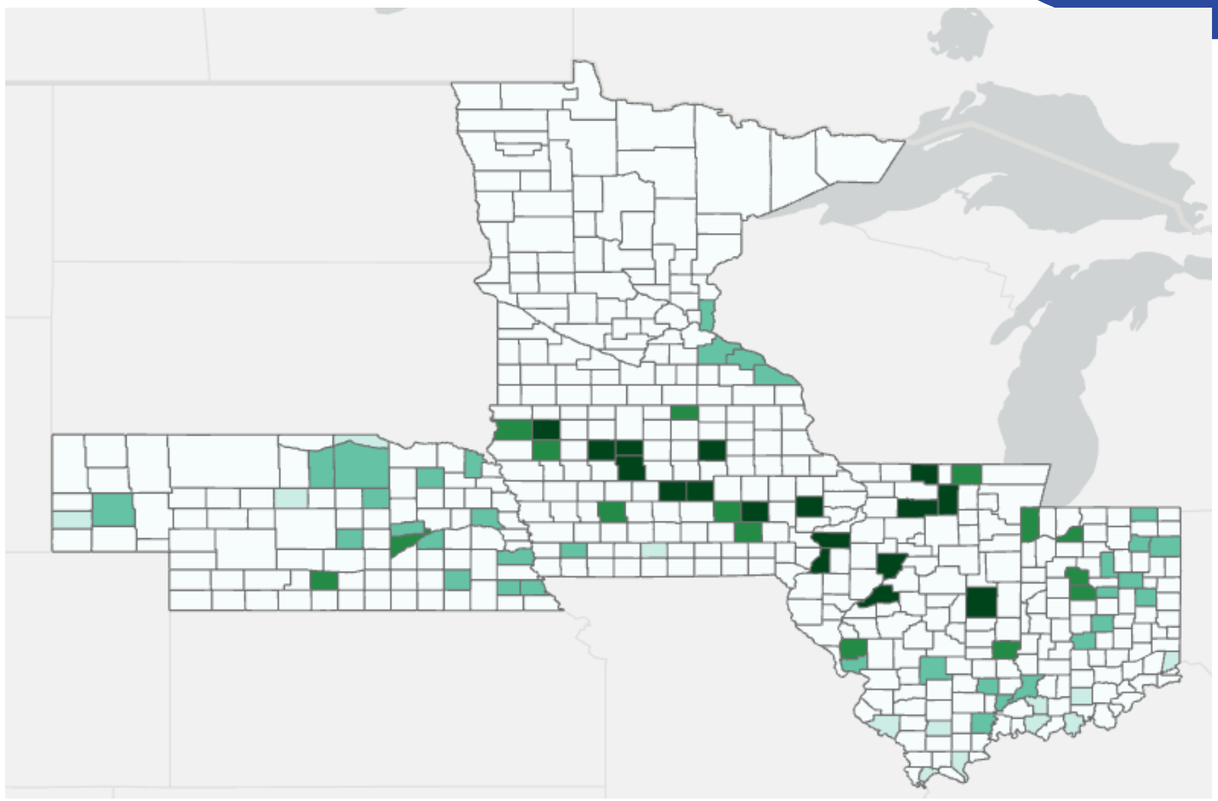
2006:0.27961

2020 :0.25864

# 3.RESULTS:

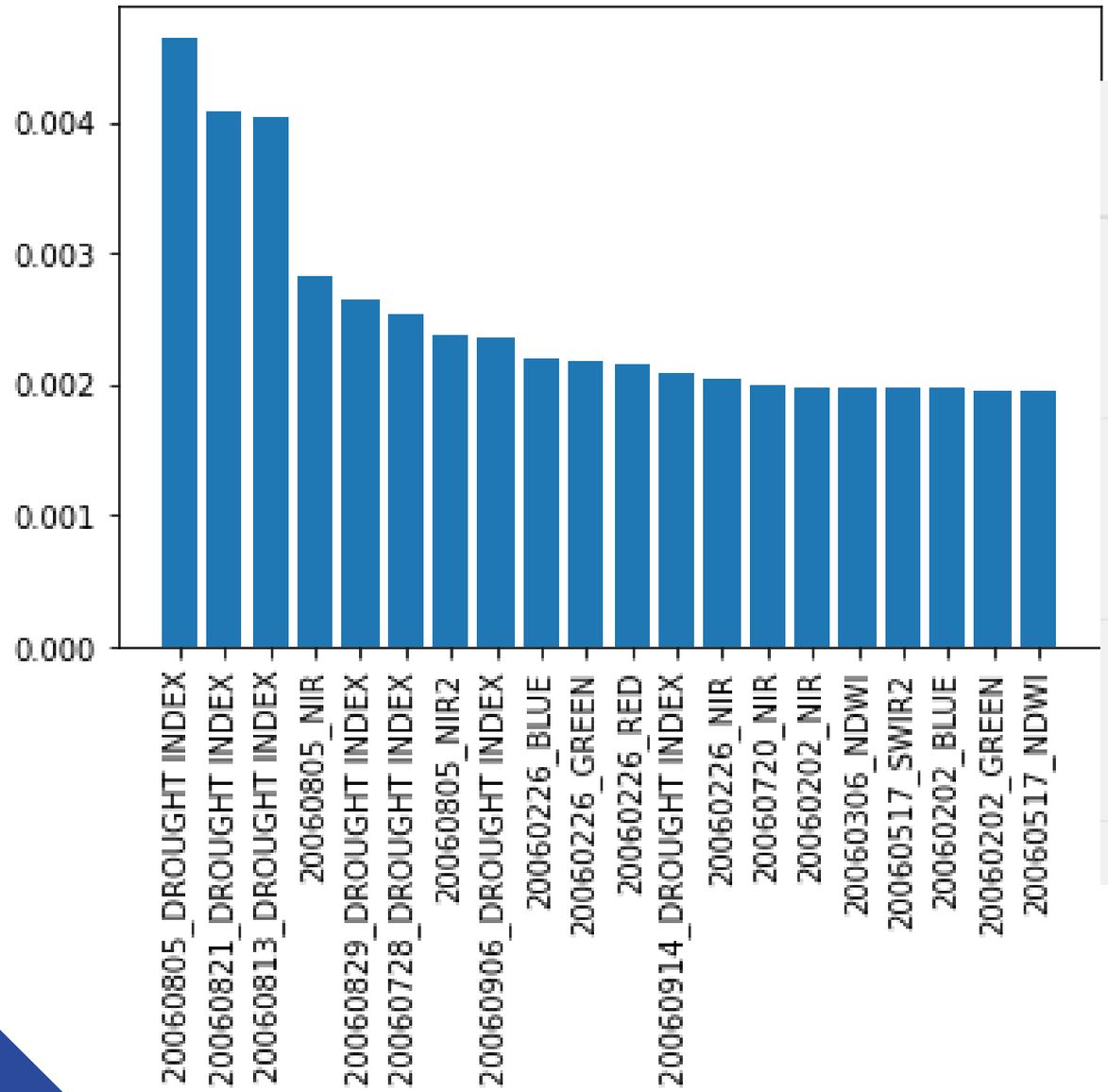
## CORN YEILDS PREDICTION : 2003

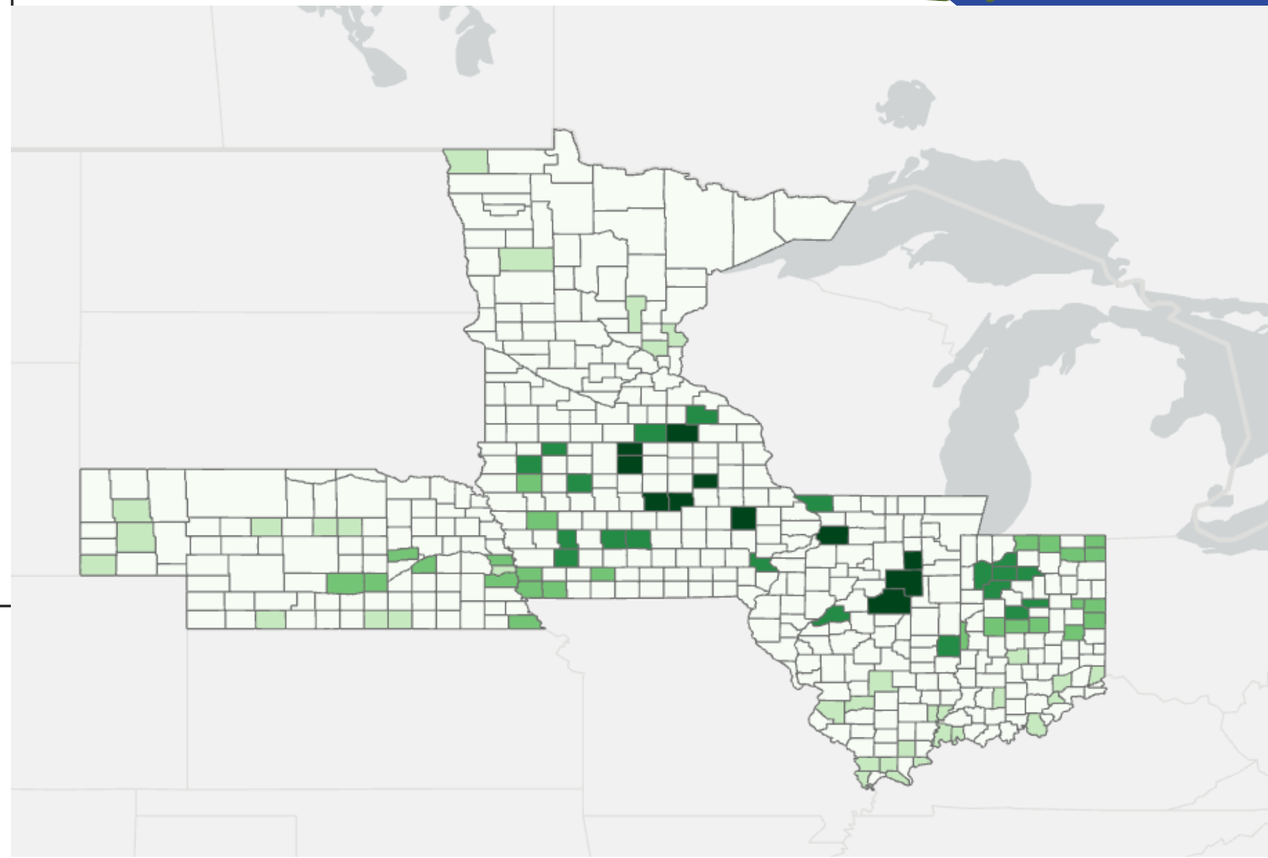


# 3.RESULTS:

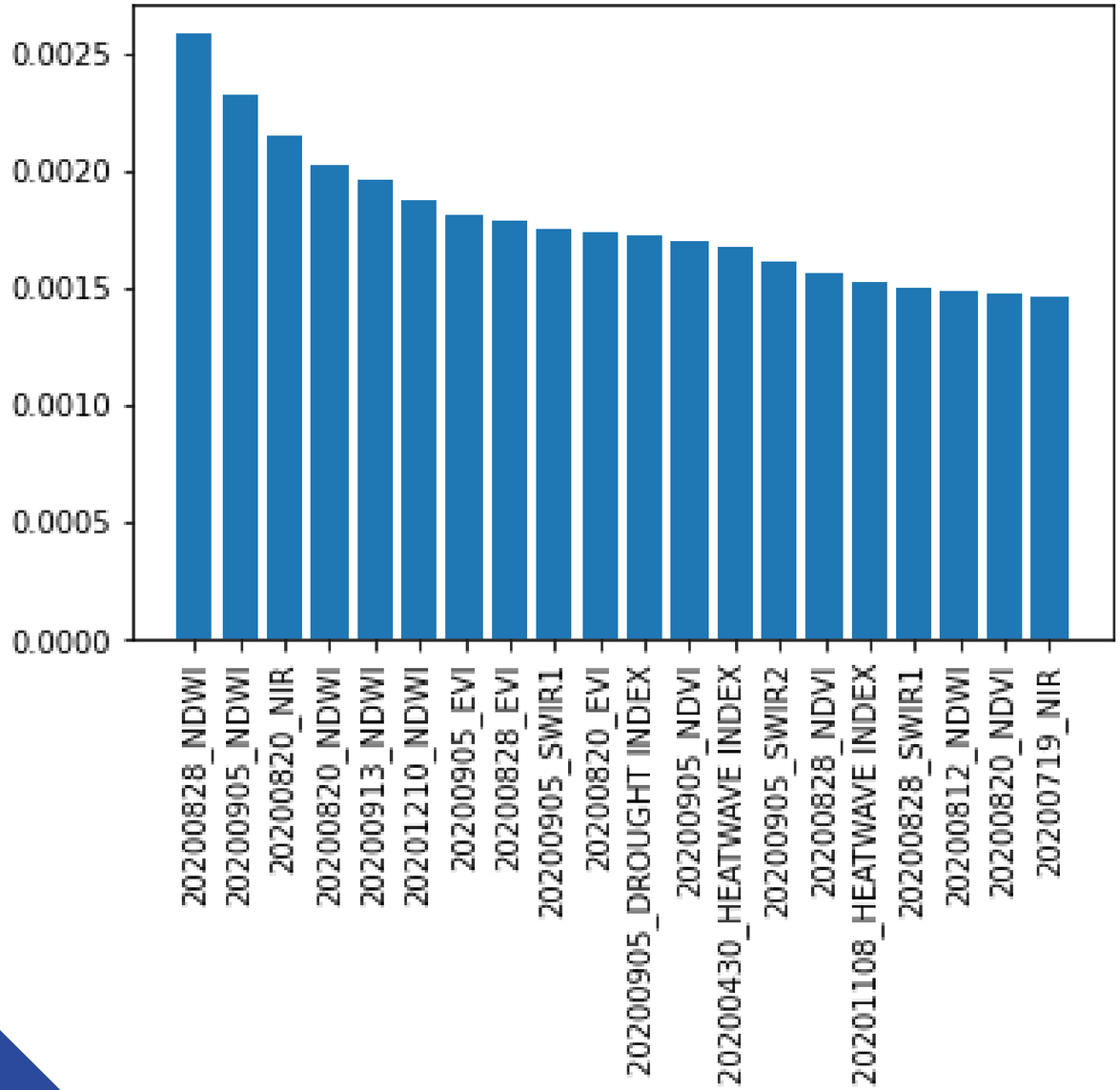
## CORN YEILDS PREDICTION : 2006

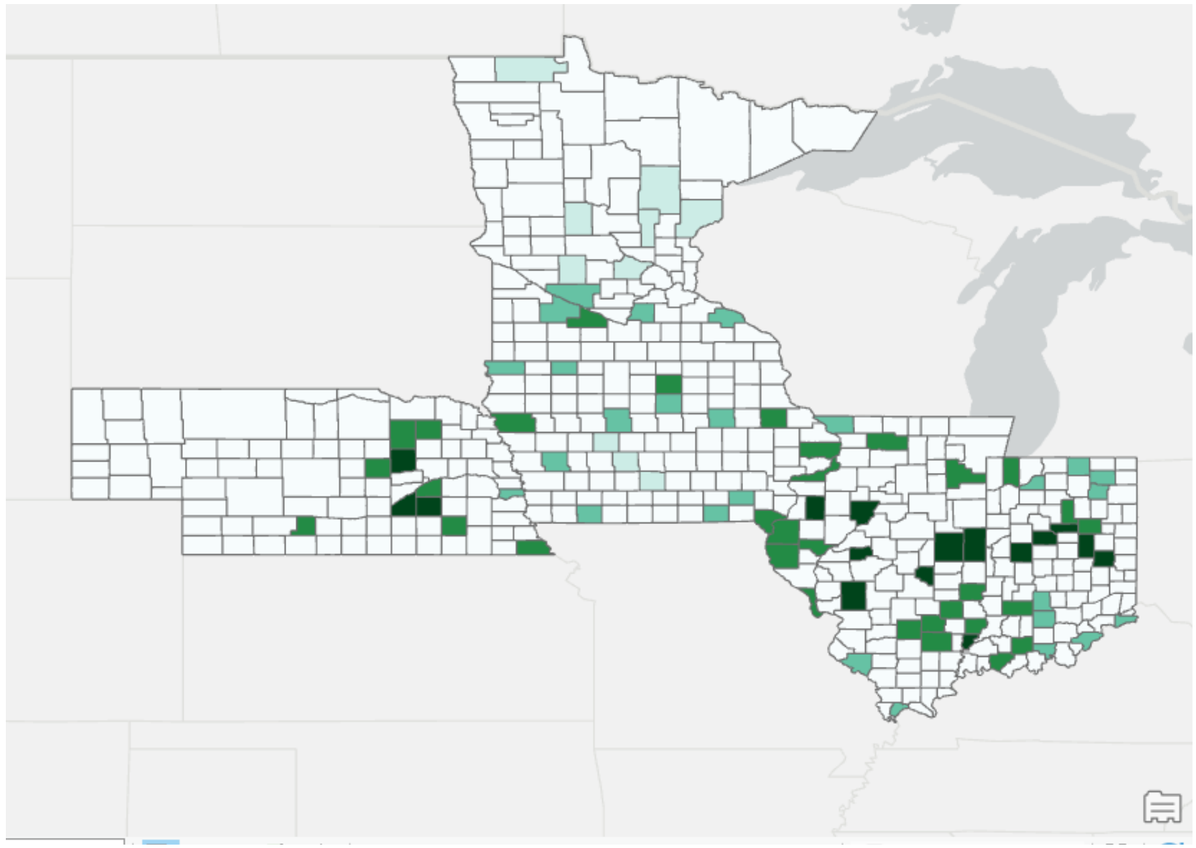


# 3.RESULTS:

## CORN YEILDS PREDICTION : 2020



# 3.RESULTS:

## SOYBEAN YEILDS PREDICTION

```
R^2 score 2003 in the test set is 0.61804914164647 33
R^2 score 2004 in the test set is 0.5721981587570519
R^2 score 2005 in the test set is 0.50313011282139 69
R^2 score 2006 in the test set is 0.6351032043874076
R^2 score 2007 in the test set is 0.7340657918577165
R^2 score 2008 in the test set is 0.7173968803438671
R^2 score 2009 in the test set is 0.7418336940890924
R^2 score 2010 in the test set is 0.7268022554860112
R^2 score 2011 in the test set is 0.7645909991328433
R^2 score 2012 in the test set is 0.6717533548534436
R^2 score 2013 in the test set is 0.6962740003449773
R^2 score 2014 in the test set is 0.7665803249139457
R^2 score 2015 in the test set is 0.6469940825399436
R^2 score 2016 in the test set is 0.6678789687285525
R^2 score 2017 in the test set is 0.6451554281716145
R^2 score 2018 in the test set is 0.6925910319099695
R^2 score 2019 in the test set is 0.6336581959636767
R^2 score 2020 in the test set is 0.6032778870139556
R^2 score 2021 in the test set is 0.6793796224493992
```

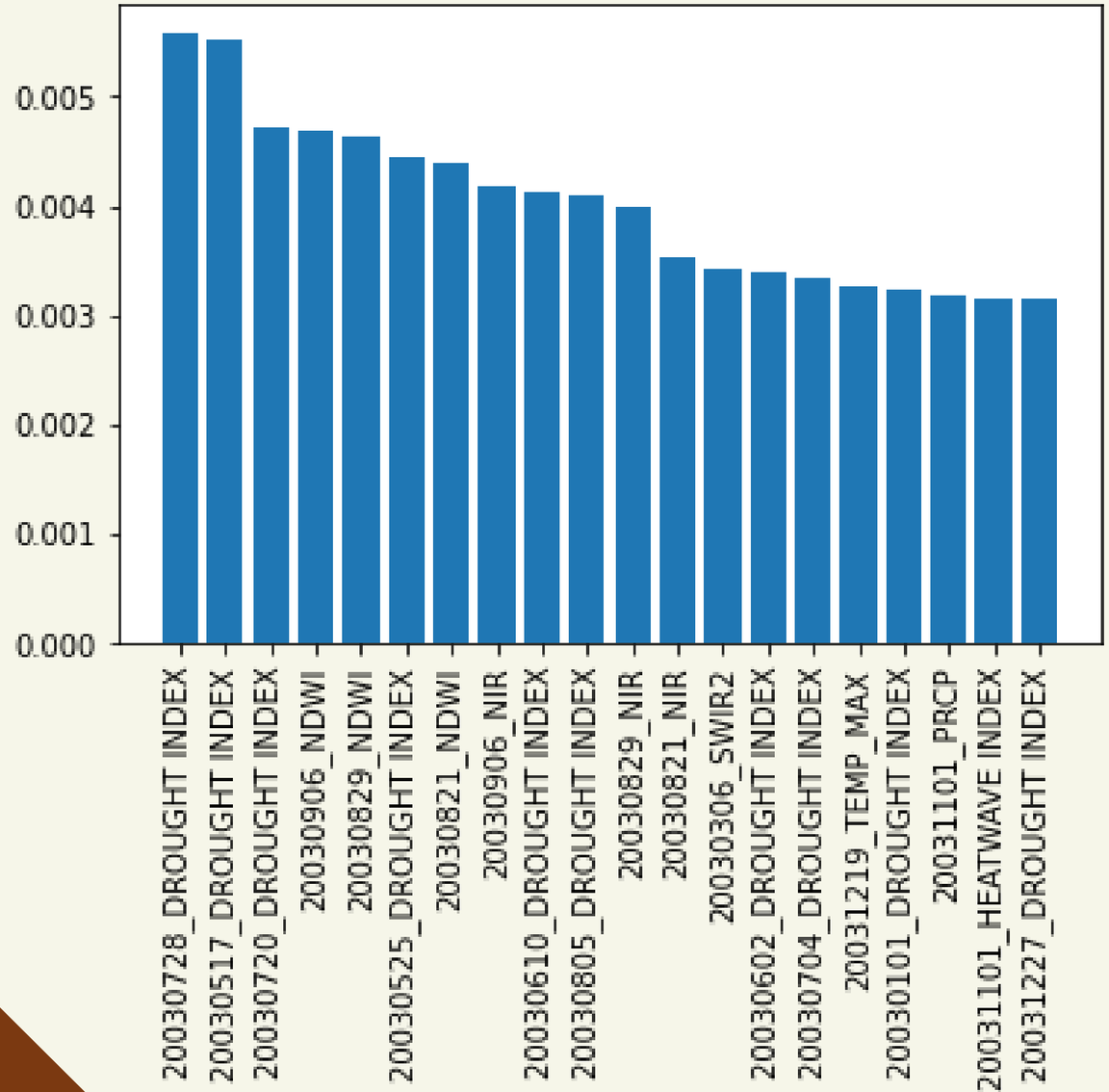
2003: 0.61804

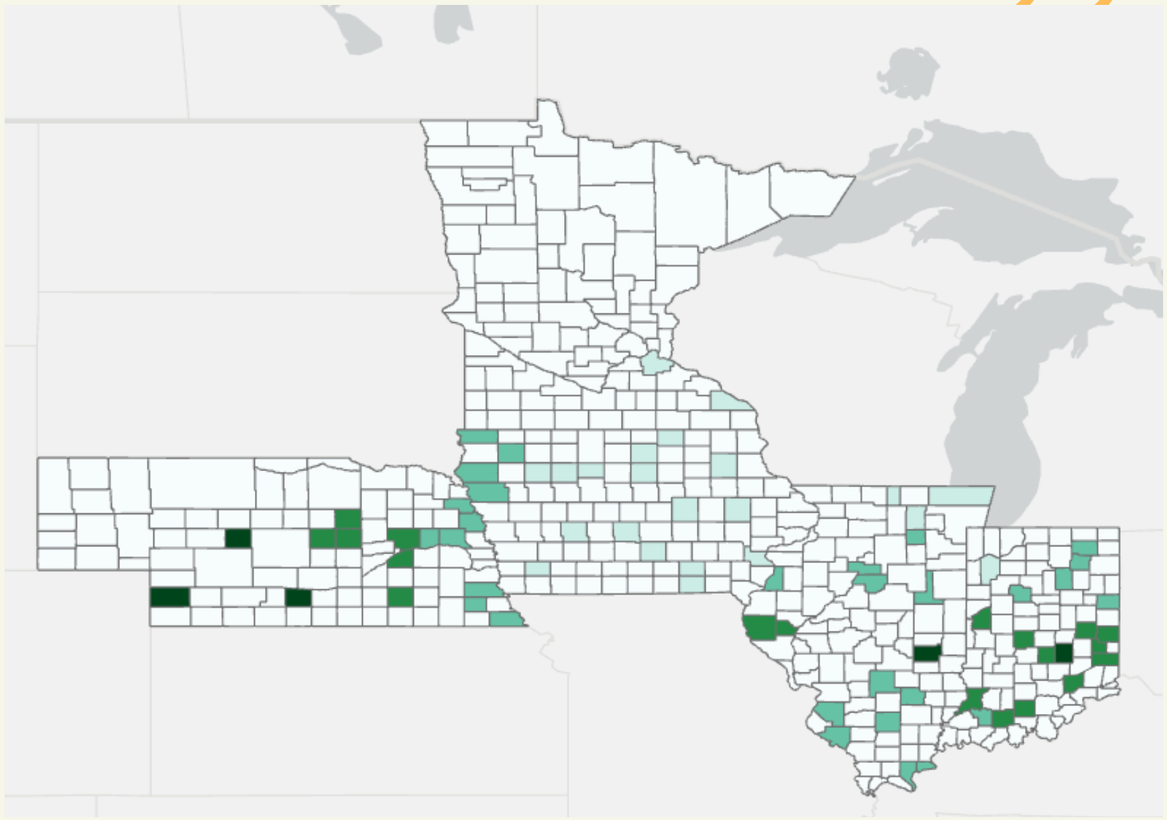
2006:0.63510

2020 :0.67937

# 3.RESULTS:

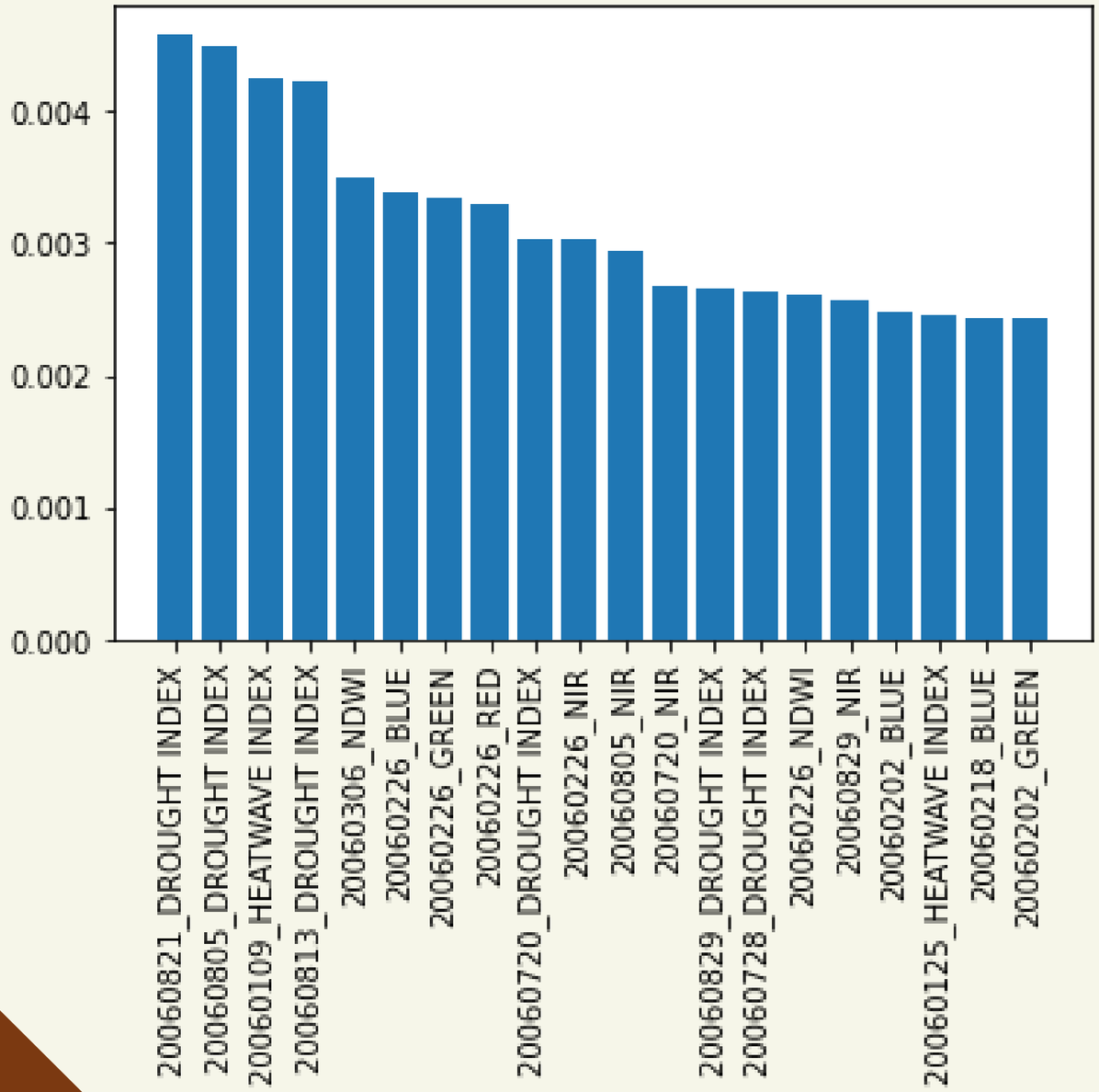
## SOYBEAN YEILDS PREDICTION : 2003

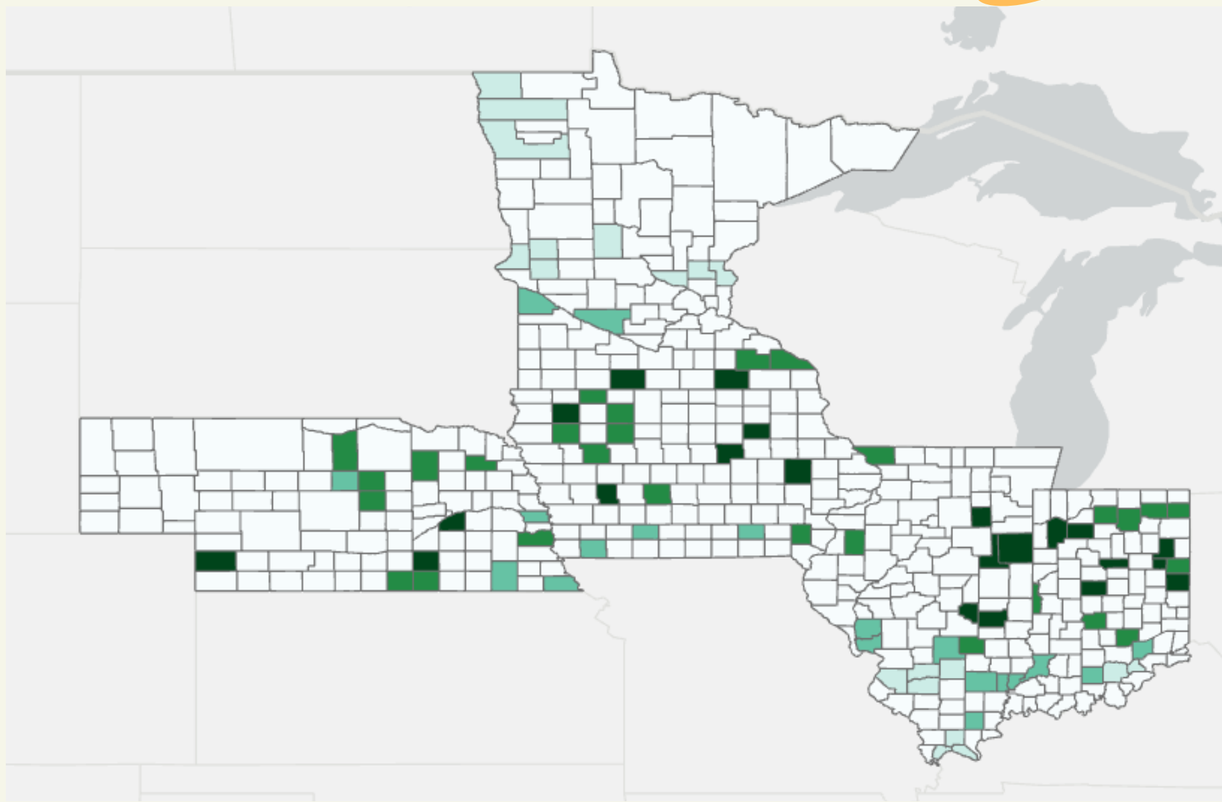


# 3.RESULTS:

## SOYBEAN YEILDS PREDICTION : 2006



# 3.RESULTS:

## SOYBEAN YEILDS PREDICTION : 2020