

Arkansas Lottery Spending

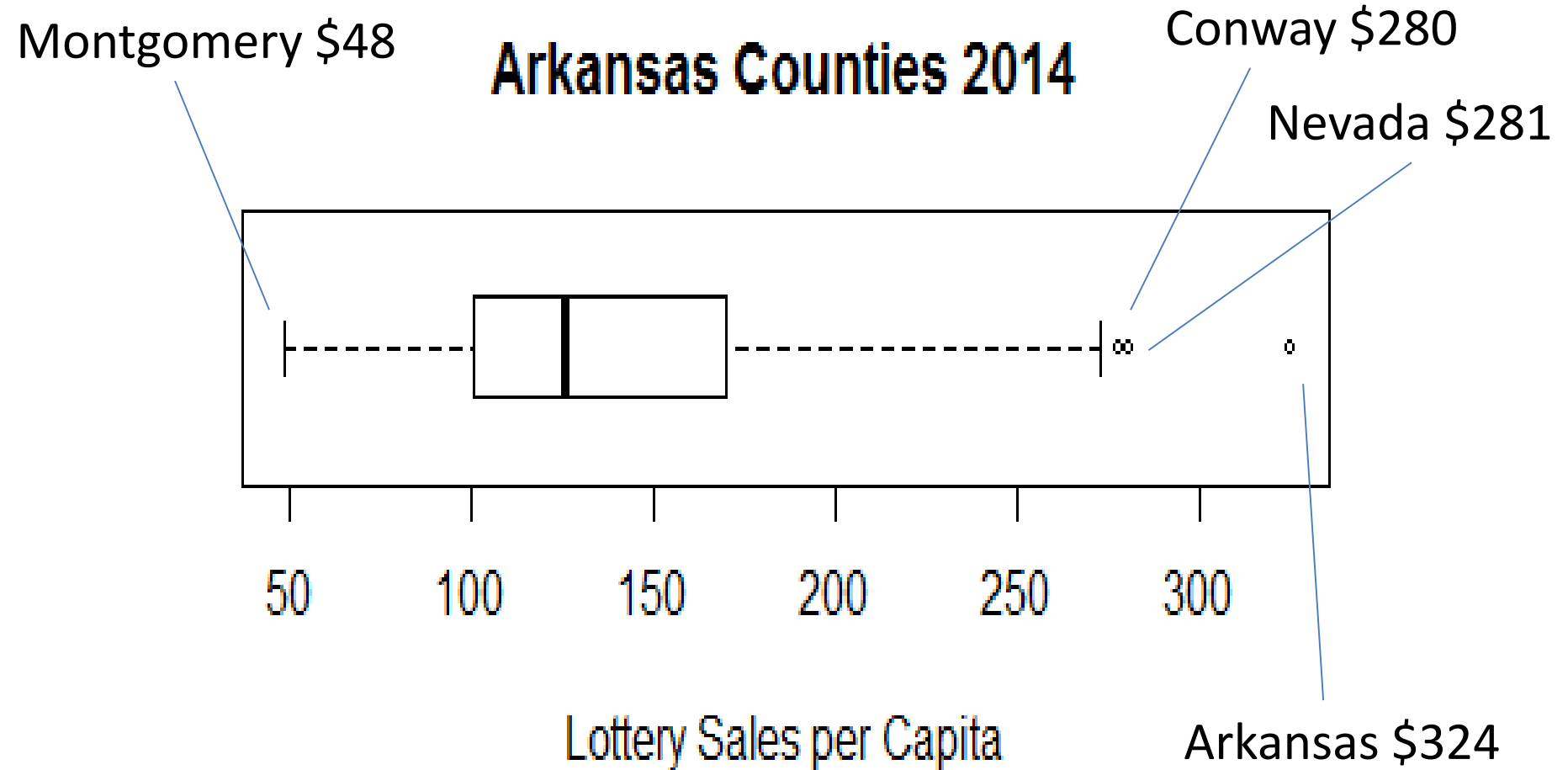
Michael Lloyd



HENDERSON
STATE UNIVERSITY

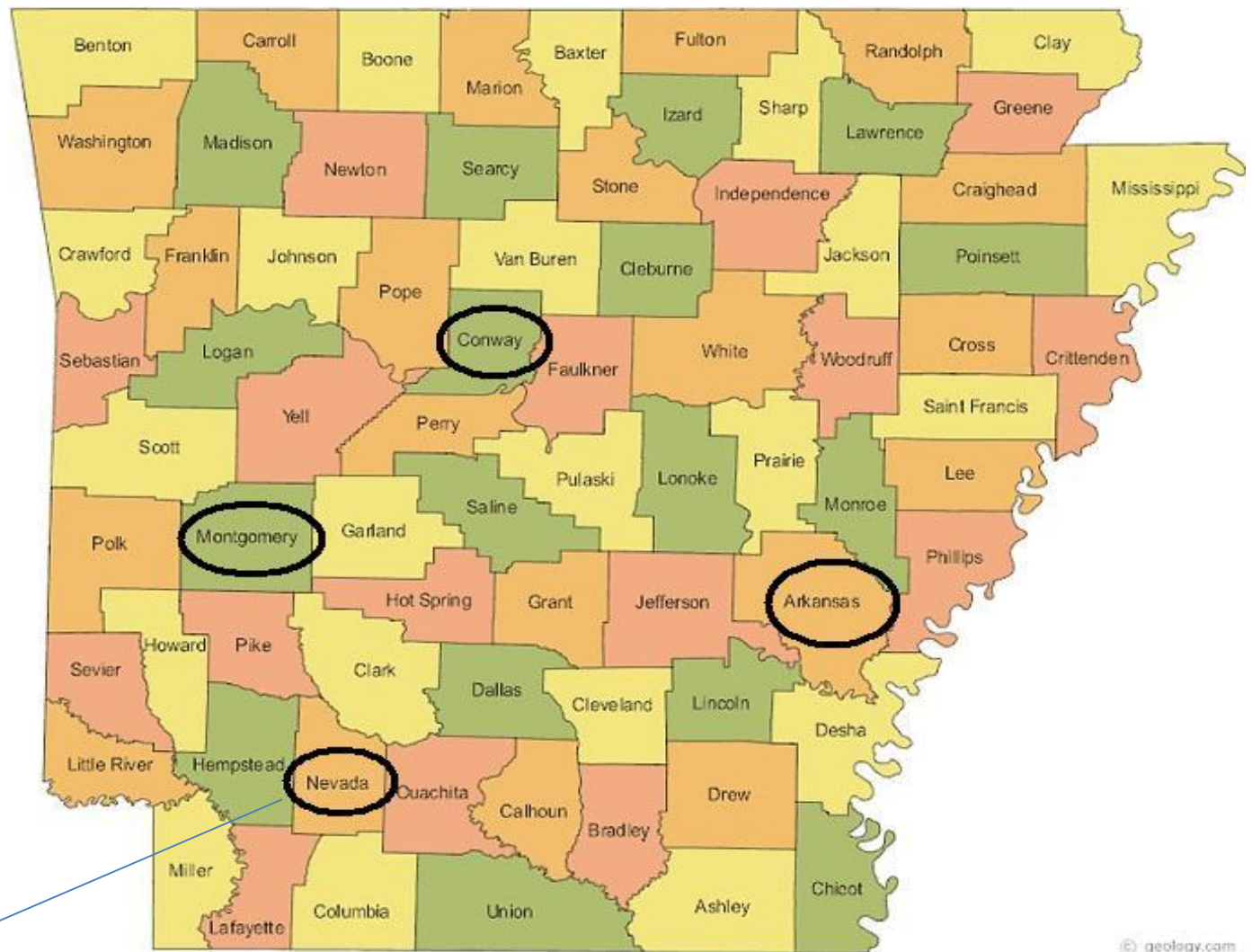
Dollars per person

Arkansas Counties 2014



Census data was only for 2010 and estimated for 2014.

Counties with extreme spending



75
counties

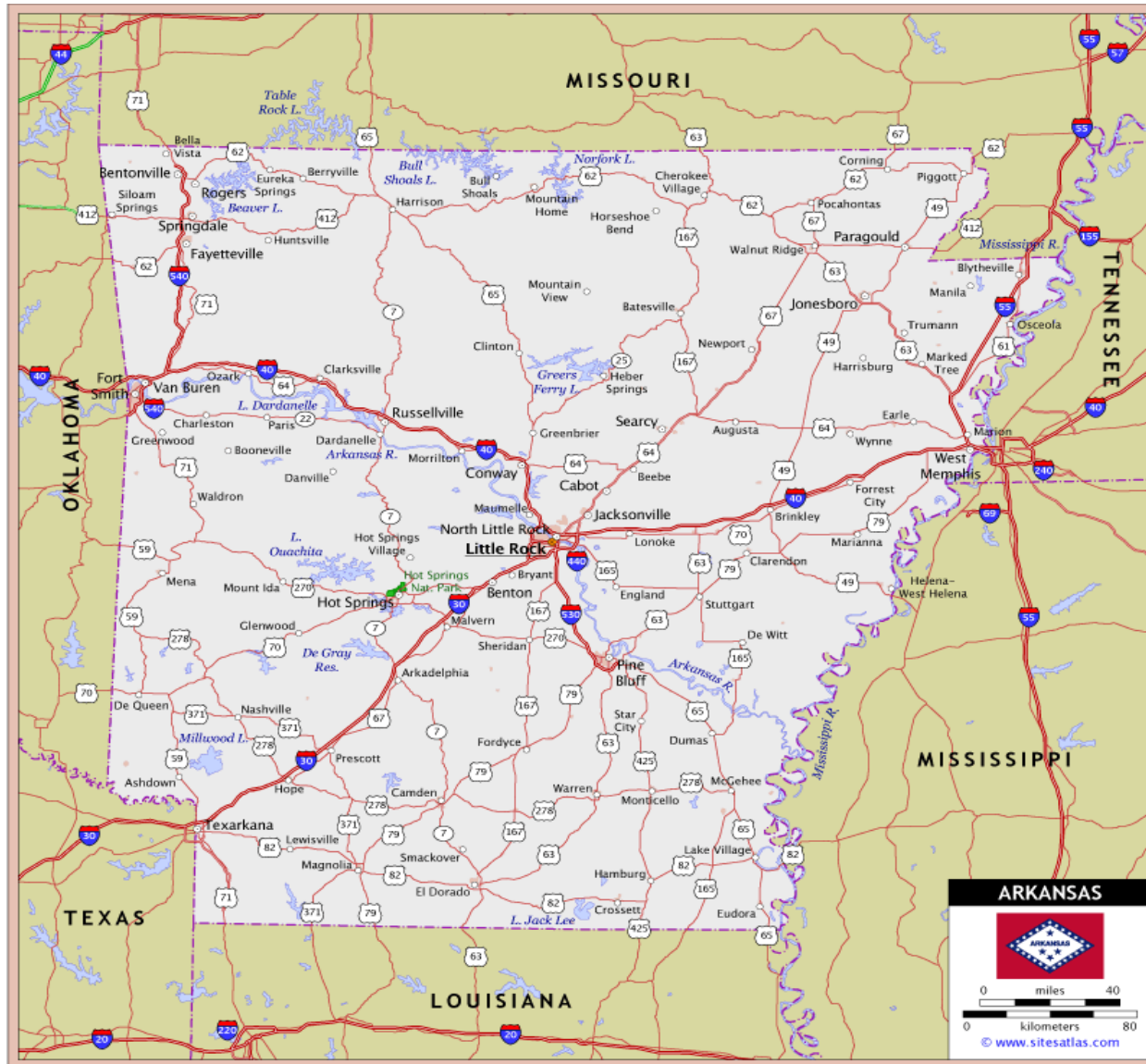
Poverty
rate 25%,
Interstate
traffic

<http://www.arcounties.org/counties/>

Response: LotterySalesPerCapita, 46 Predictors:

IndianPctJul14, BlackPctJul14, WhitePctJul14,
WhiteNotHispanicPctJul14, TotalRetailSalesPerCapita,
NoHealthInsurancePct, FemalePctJul14, MeanTravelTimeWork,
MedianMonthlyOwnerCostsWithoutMortgage, TwoRacesPctJul14,
OwnerOccupiedHousingPct, PersonsPerHousehold, PopPctChg,
MedianValueOwnerHousing, PopPctUnder5Jul14, ForeignersPct,
HispanicPctJul14, AsianPctJul14, NonEnglishSpeakerPct, PovertyPct,
LandArea, PacificPctJul14, MedianHouseholdIncome,
BuildingPermits, MedianMonthlyOwnerCostsWithMortgage,
PopPctUnder18Jul14, PopPctOver64Jul14, LaborForceTotalPct,
LaborForceFemalePct, TotalNonemployerEstablishments,
PopulationDensity, TotalEmploymentPctChange, Veterans,
Households, HousingUnitsJul14, TotalAnnualPayroll,
MedianGrossRent, LivingSameHousePct, HighSchoolOrHigherPct,
BSorHigherPct, DisabilityPct, TotalRetailSales, PerCapitalIncome,
TotalEmployers, TotalEmployment

Interstates



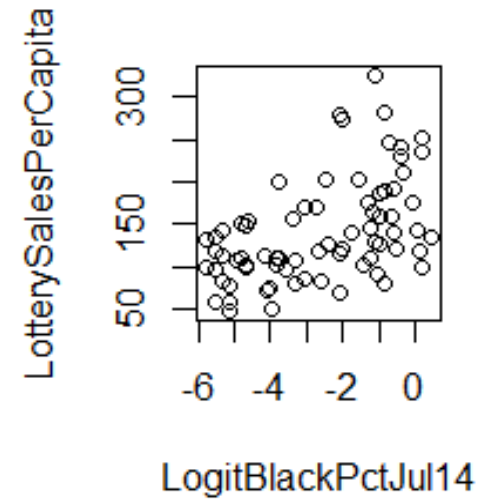
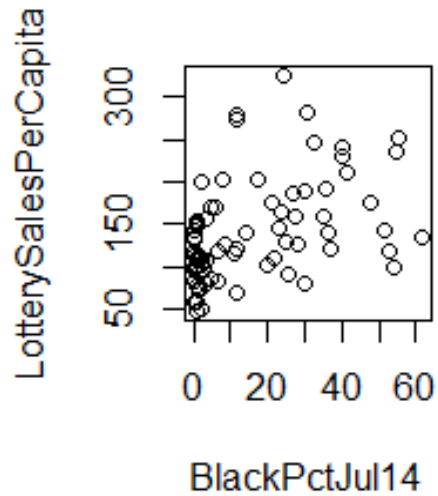
<http://www.sitesatlas.com/Flash/USCan/static/ARFH.htm>

More predictors

- Interstate (truckers)
 - North
 - South
 - East
 - West
 - Wet (alcohol sales)
- Some outliers near the border,
out of state trade

Logit transformations

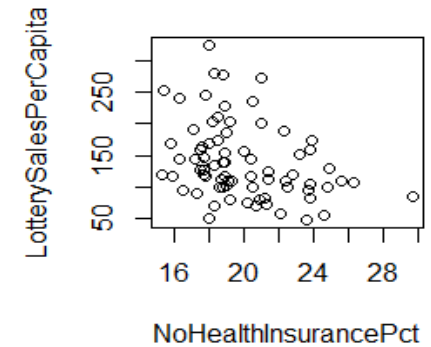
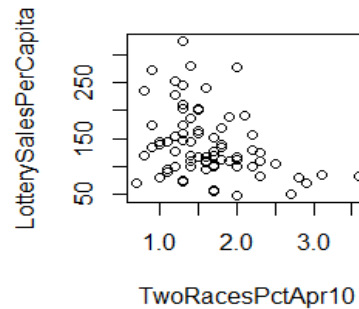
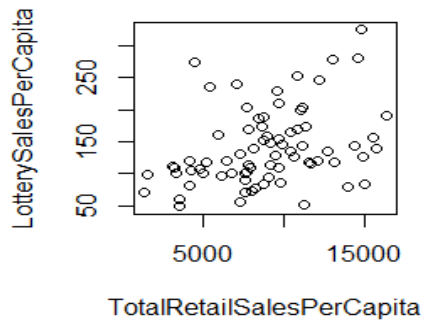
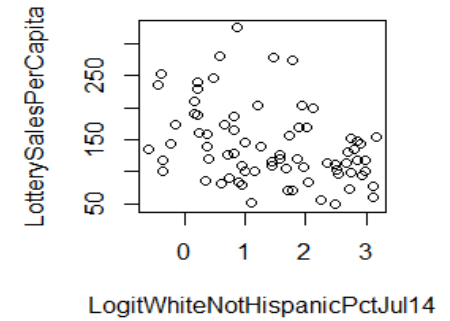
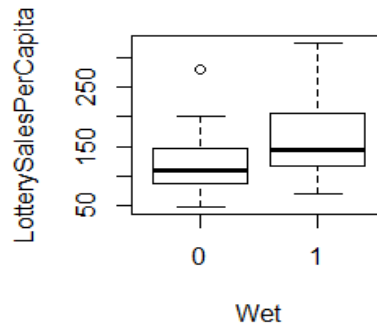
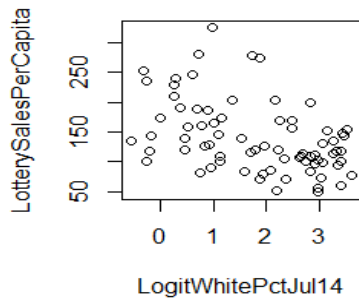
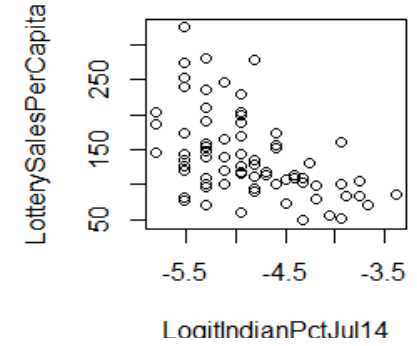
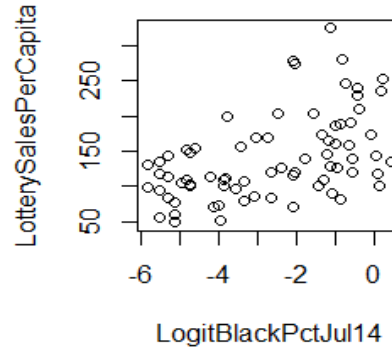
- BlackPctJul14
- IndianPctJul14
- WhitePctJul14
- WhiteNotHispanicPctJul14
- OwnerOccupiedHousingPct



Top predictors

Variable	r	r ²
LogitBlackPctJul14	0.500	0.250
LogitIndianPctJul14	-0.485	0.235
LogitWhitePctJul14	-0.450	0.202
Wet	0.391	0.153
LogitWhiteNotHispanicPctJul14	-0.374	0.140
TotalRetailSalesPerCapita	0.351	0.123
TwoRacesPctApr10	-0.337	0.114
NoHealthInsurancePct	-0.327	0.107

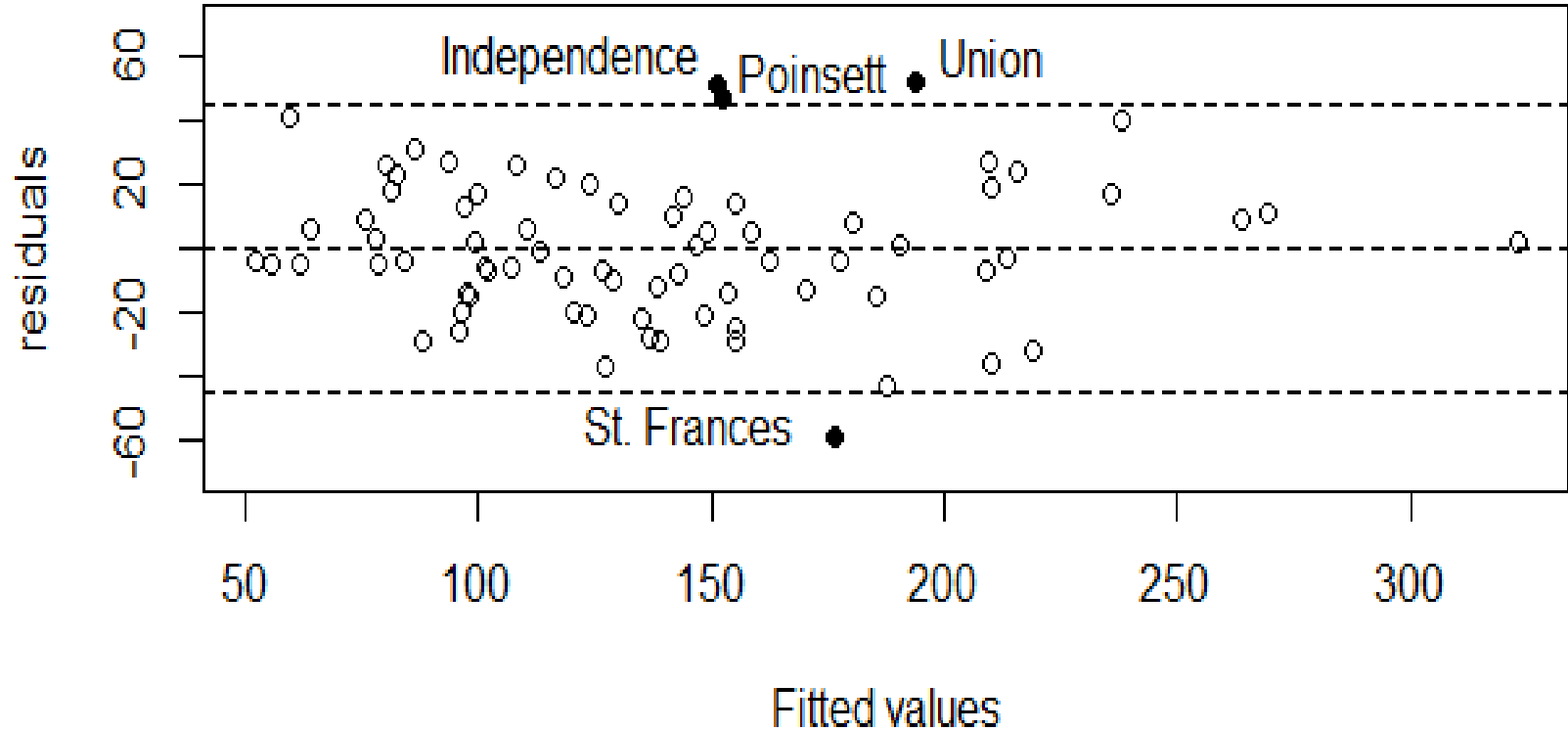
Plots for top predictors



Optimal model using AIC ($R^2 = 86\%$)

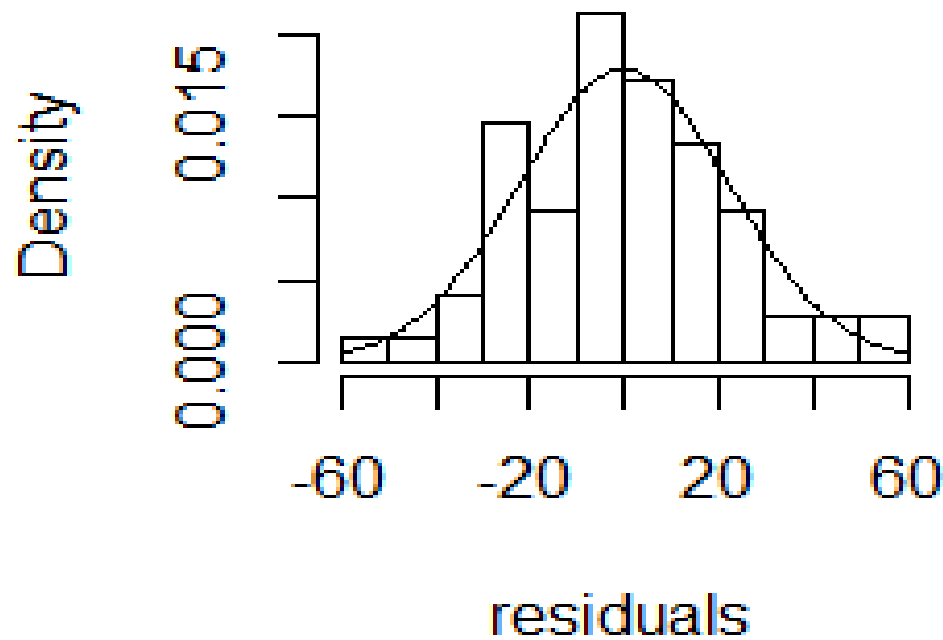
LotterySalesPerCapita ~ LogitIndianPctJul14 +
LogitBlackPctJul14 + LogitWhitePctJul14 +
TotalRetailSalesPerCapita + NoHealthInsurancePct +
FemalePctJul14 +
MedianMonthlyOwnerCostsWithoutMortgage +
TwoRacesPctJul14 + PopPctUnder5Jul14 + HispanicPctJul14
+ NonEnglishSpeakerPct + MedianHouseholdIncome +
MedianMonthlyOwnerCostsWithMortgage +
PopPctUnder18Jul14 + LaborForceTotalPct +
LaborForceFemalePct + PopulationDensity + Veterans +
Households + HousingUnitsJul14 + TotalAnnualPayroll +
HighSchoolOrHigherPct + BSorHigherPct + DisabilityPct +
PerCapitalIncome + Interstate + East + West + North + South
+ Wet (31 predictors)

Residuals vs. fitted values based on AIC

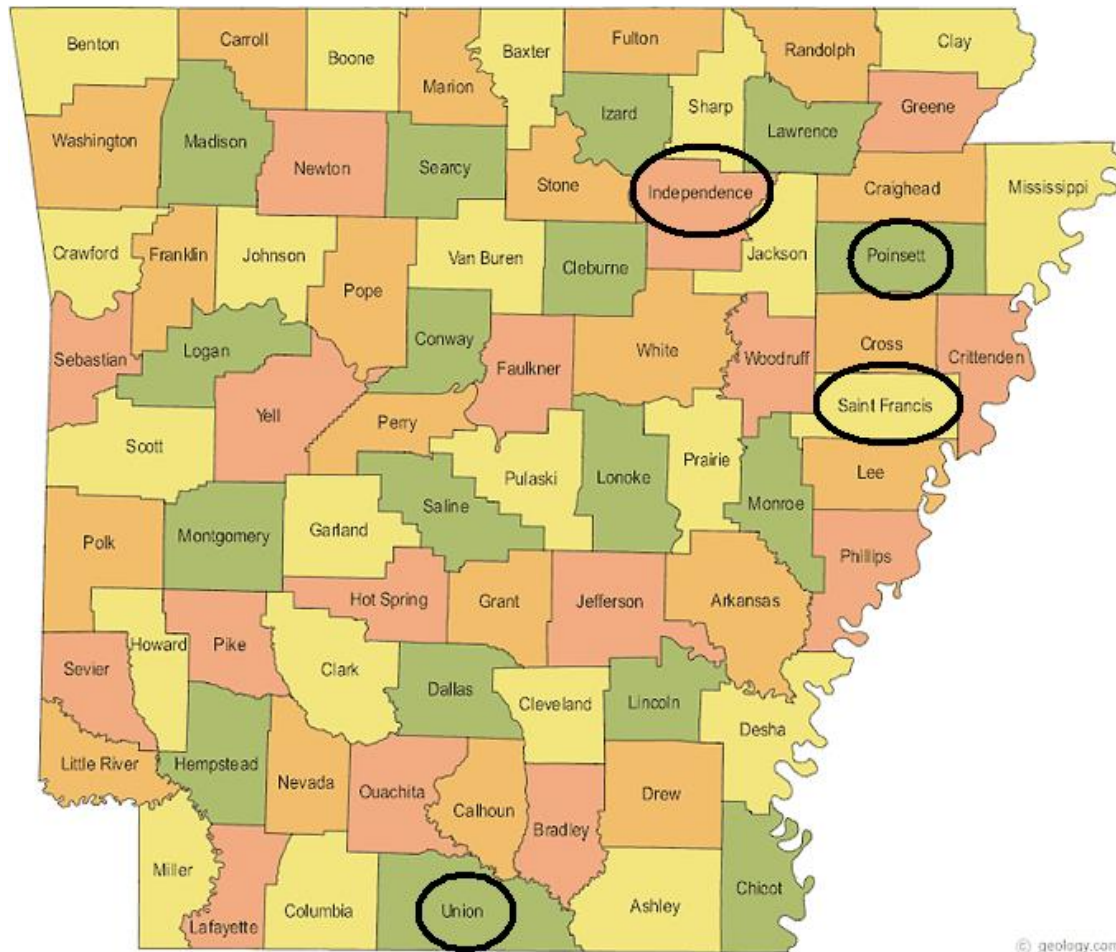


Distribution of residuals based on AIC model

Histogram of residuals



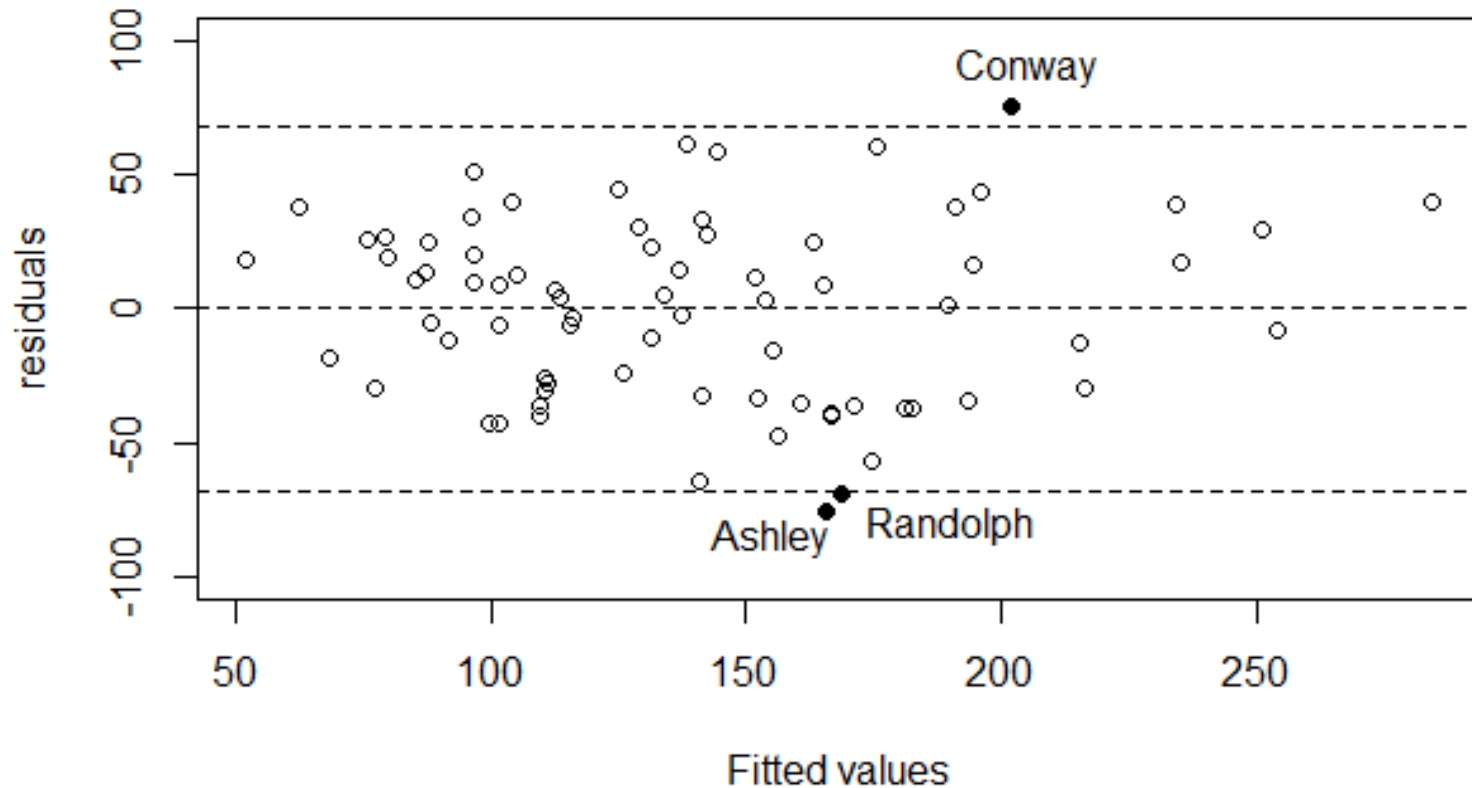
Map of outliers based on AIC



Optimal model using p-values

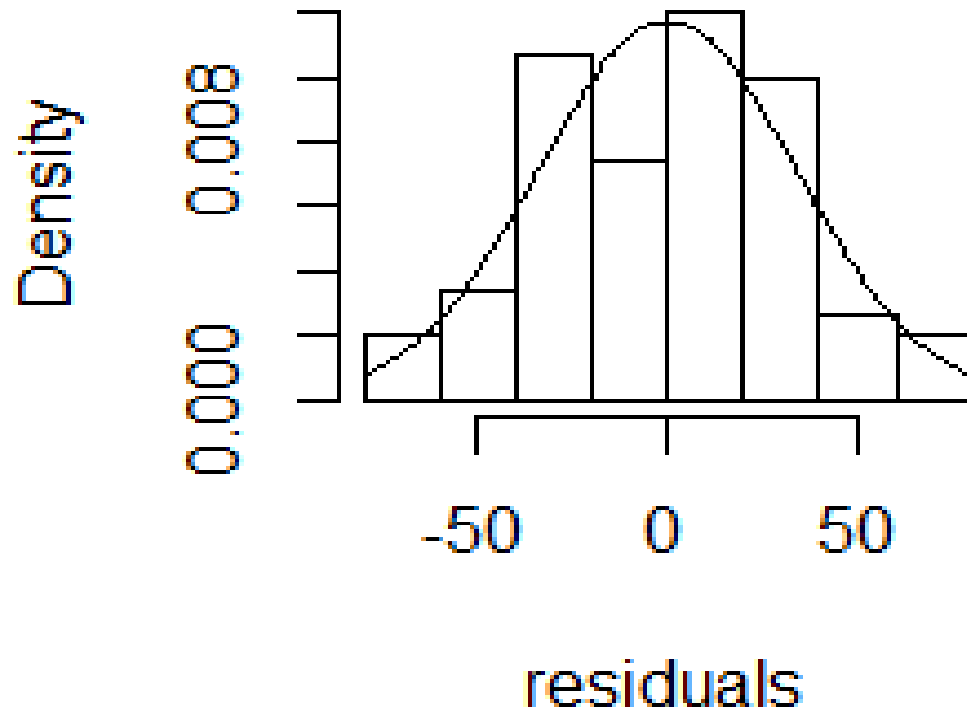
	Estimate	Pr(> t)
(Intercept)	-1.585e+02	0.34218
LogitIndianPctJul14	-6.359e+01	2.22e-06
LogitWhitePctJul14	-1.830e+01	0.00199
TotalRetailSalesPerCapita	5.716e-03	0.00172
NoHealthInsurancePct	6.526e+00	0.02102
LogitOwnerOccupiedHousingPct	7.976e+01	0.00129
PersonsPerHousehold	-1.353e+02	0.00909
PopPctUnder5Jul14	2.863e+01	0.00199
LandArea	8.405e-02	0.02583
MedianHouseholdIncome	4.062e-03	0.01636
MedianMonthlyOwnerCostsWithMortgage	-3.239e-01	6.28e-05
Interstate	3.116e+01	0.01093
Wet	2.653e+01	0.02226

Residuals vs. fitted values based on p vals

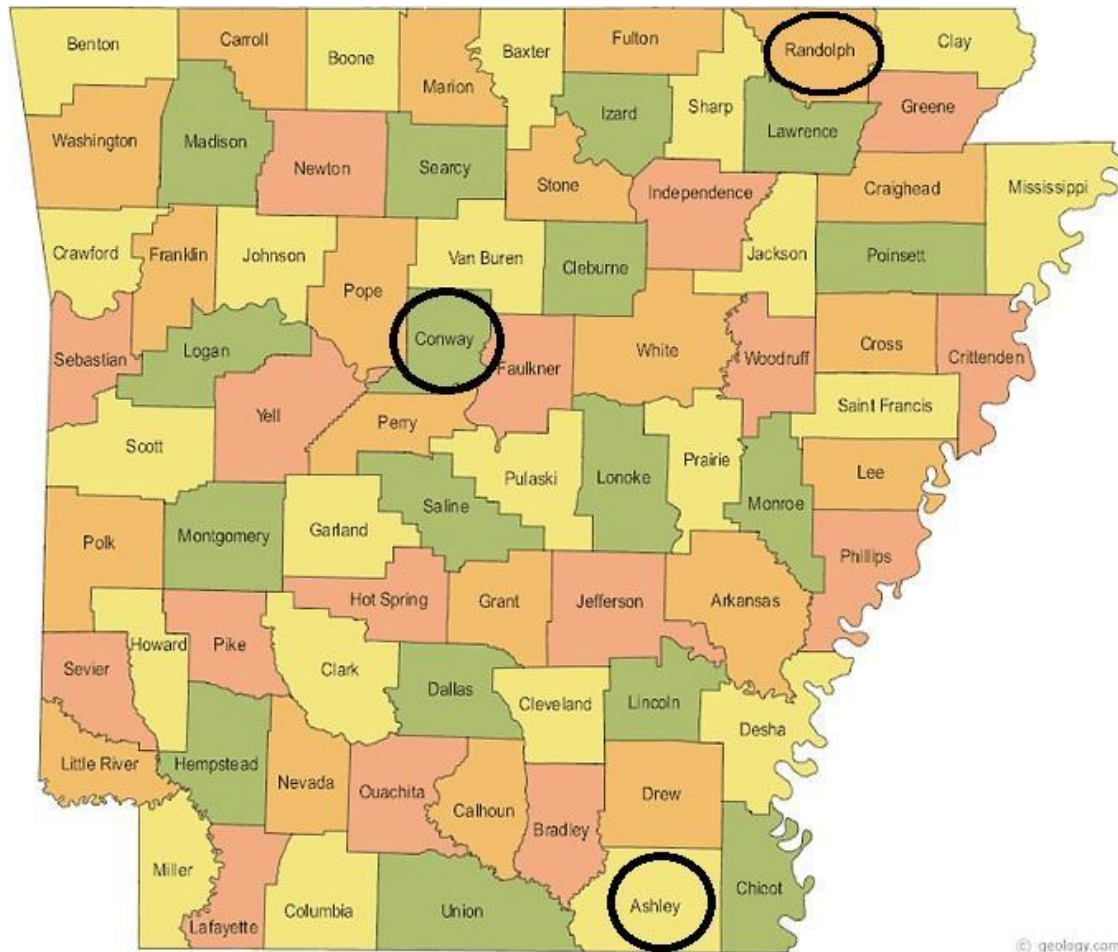


Distribution of residuals based on p vals

Histogram of residuals



Map of outliers based on p vals



References

- Arkansas Scholarship Lottery Sales by Month and County (<http://www.pulseofconway.com/lotterypage.php>)
- Demographic data (<http://www.census.gov>)
- “Poorer counties top lottery lists,” Arkansas Democratic Gazette, August 14, 2011. Thanks to Fred Worth for sharing this article.