Highway Contract Bid Prediction

Helping Contractors Win More Work at the Right Price

NC Department of Transportation

- State DoT releases highway construction contracts
- Contractors bid on projects
- Lowest bidder awarded

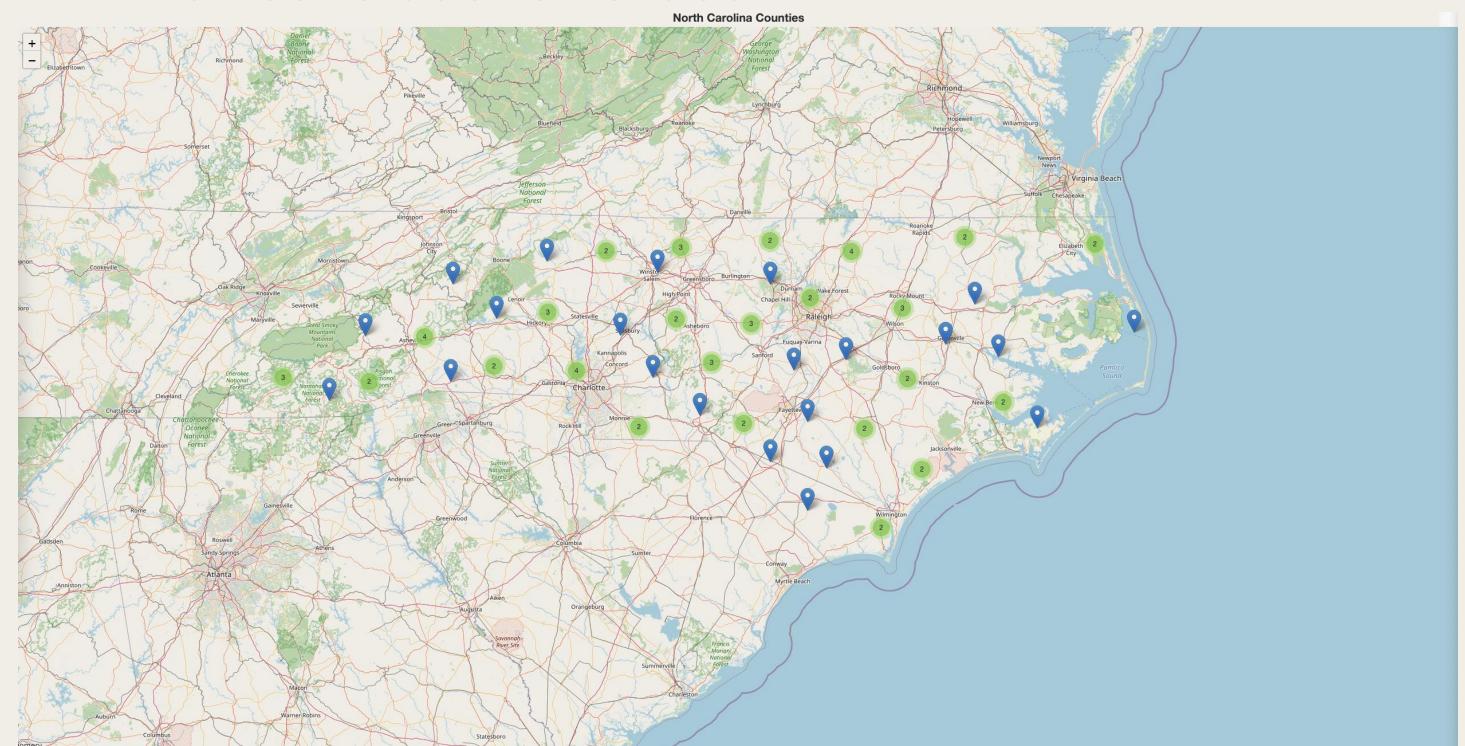


Fig. 1: NC Counties

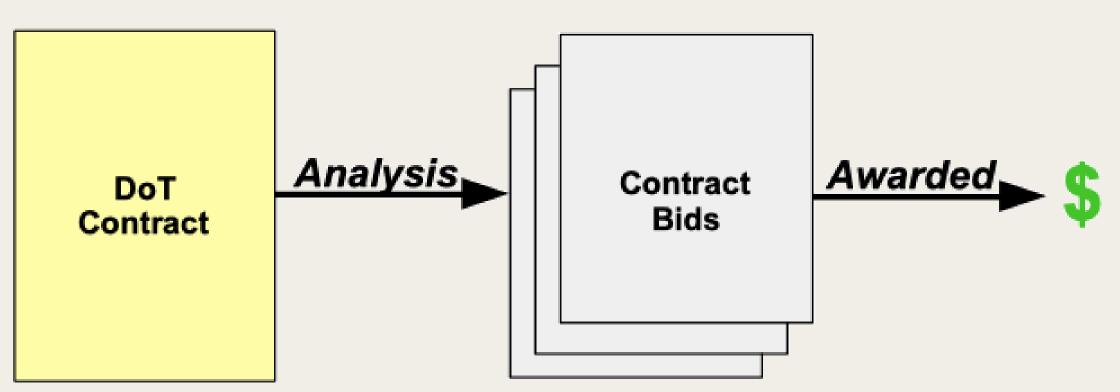


Fig. 2: Contract Stages Overview

Contract Overview

- Required Items
- Item Quantities
- Location
- Timeline

					Contractor
roposal	Line	Item	Quantity	Unit	Description
C204988	1	0000100000-N	1	LS	MOBILIZATION
	2	0000400000-N	1	LS	CONSTRUCTION SURVEYING
	3	0015000000-N	3	EA	SEALING ABANDONED WELLS
	4	0043000000-N	1	LS	GRADING
	5	0050000000-E	1	ACR	SUPPLEMENTARY CLEARING & GRUBBING
	6	0057000000-E	100	сү	UNDERCUT EXCAVATION
	7	0134000000-E	7140	СҮ	DRAINAGE DITCH EXCAVATION
	8	0195000000-E	100	СҮ	SELECT GRANULAR MATERIAL
	9	0196000000-E	1000	SY	GEOTEXTILE FOR SOIL STABILIZATION
	10	0199000000-E	500	SF	TEMPORARY SHORING
	11	0318000000-E	1540	TON	OUNDATION CONDITIONING MATERIAL, MINOR STRUCTU
	12	0321000000-E	4820	SY	FOUNDATION CONDITIONING GEOTEXTILE
	13	0344000000-E	124	LF	18" SIDE DRAIN PIPE
	14	0366000000-E	272	LF	15" RC PIPE CULVERTS, CLASS III
	15	0372000000-E	232	LF	18" RC PIPE CULVERTS, CLASS III
				LF	18" RC PIPE CULVERTS, CLASS III
	16	0378000000-E	1824	LF	24" RC PIPE CULVERTS, CLASS III
	17	0384000000-E	280	LF	30" RC PIPE CULVERTS, CLASS III
	18	0390000000-E	592	LF	36" RC PIPE CULVERTS, CLASS III
	19	0396000000-E	344	LF	42" RC PIPE CULVERTS, CLASS III
	20	0402000000-E	112	LF	48" RC PIPE CULVERTS, CLASS III
	21	0414000000-E	48	LF	60" RC PIPE CULVERTS, CLASS III
	22	0448000000-E	72	LF	****" RC PIPE CULVERTS, CLASS IV (54")
	23	0448200000-E	4544	LF	15" RC PIPE CULVERTS, CLASS IV
				LF	15" RC PIPE CULVERTS, CLASS IV
	24	0448300000-E	4128	LF	18" RC PIPE CULVERTS, CLASS IV

Fig. 3: Example Contract Items

Predict competitor pay item prices based on bidding dynamics to minimize money left on the table and maximize contract win percentage

- Contract Clusters
 - Similar Pay items
 - Similar Contractors
 - Similar Location
 - Similar Quantities

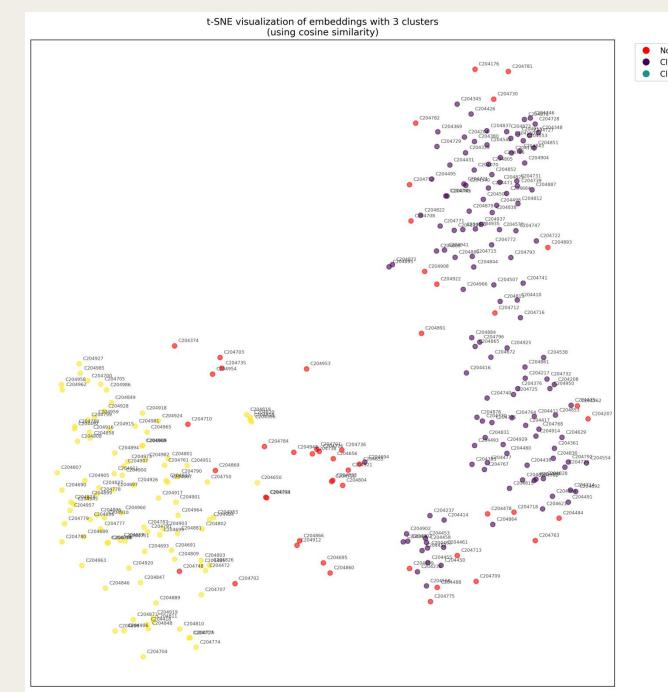


Fig. 5: TSNE Dimensionality Reduction **Visualizing Contract Embedding Clusters**

Data Collection and Processing

- Scrape NCDoT website using Selenium
- Limit Scope of Considered Variables and avoid curse of dimensionality
- Transform variable representations into form of 'distance' for KNN Regression

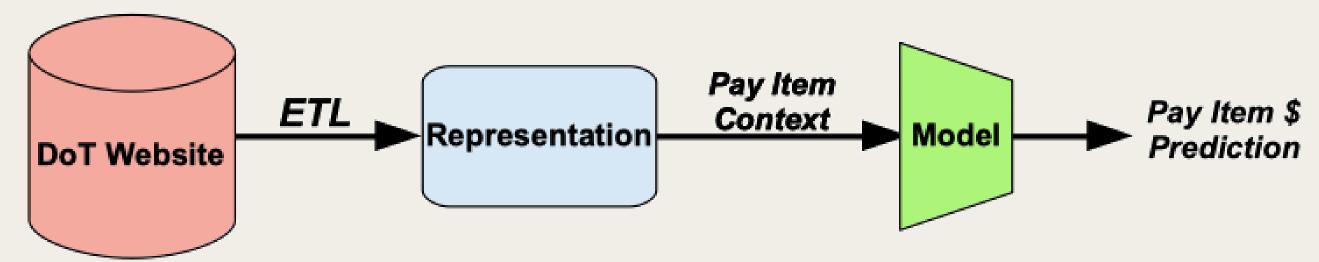


Fig. 6: Model Pipeline

Results

- Pay item predictions for each potential contractor on upcoming contract
- **Total Bid Price Predictions**
- Providing Context: Return Similar Past Contracts
- Time Savings: Weeks to minutes!

Fig. 7: Model Output Predictions to Excel File



Excel File

Fig. 8: Model Output

Fig. 9: GitHub Repo

Contractor's Perspective

- Employ estimators to review and bid on contracts; time consuming, manual process ~1-2 weeks
- Contractor's Dilemma: Maximize profit while being lowest bidder
- Minimize Money Left on the Table
- Millions of Dollars on the Line

