Financial News Sentiment Analysis with Neural Networks

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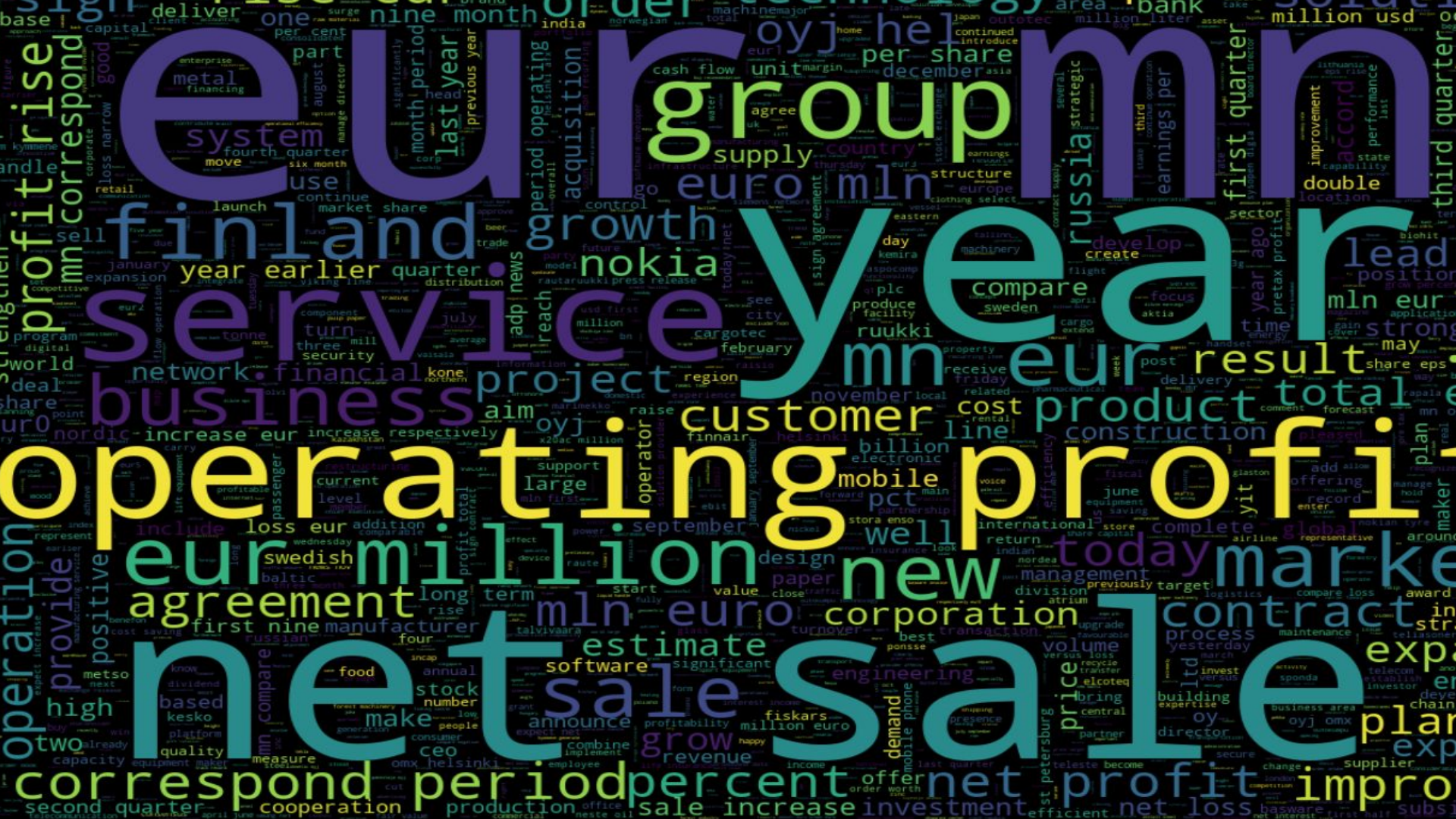
The Data - 5,000 Headlines:

Raw

	Sentiment	Headline
0	neutral	According to Gran , the company has no plans to move all production to Russia , although that is where the company is growing .
1	neutral	Technopolis plans to develop in stages an area of no less than 100,000 square meters in order to host companies working in computer technologies and telecommunications , the statement said .
2	negative	The international electronic industry company Elcoteq has laid off tens of employees from its Tallinn facility ; contrary to earlier layoffs the company contracted the ranks of its office workers , the daily Postimees reported .
3	positive	With the new production plant the company would increase its capacity to meet the expected increase in demand and would improve the use of raw materials and therefore increase the production profitability .
4	positive	According to the company 's updated strategy for the years 2009-2012 , Basware targets a long-term net sales growth in the range of 20 % -40 % with an operating profit margin of 10 % -20 % of net sales .

Transformed

	Sentiment	Headline
0	1	accord gran , company plan move production russia , although company grow .
1	1	technopolis plan develop stage area less 100,000 square meter order host company work computer technology telecommunication , statement say .
2	0	international electronic industry company elcoteq laid ten employee tallinn facility ; contrary earlier layoff company contract rank office worker , daily postimees report .
3	2	new production plant company would increase capacity meet expect increase demand would improve use raw material therefore increase production profitability .
4	2	accord company update strategy year 2009-2012 , basware target long-term net sale growth range 20 % -40 % operating profit margin 10 % -20 % net sale .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third quarter
lead
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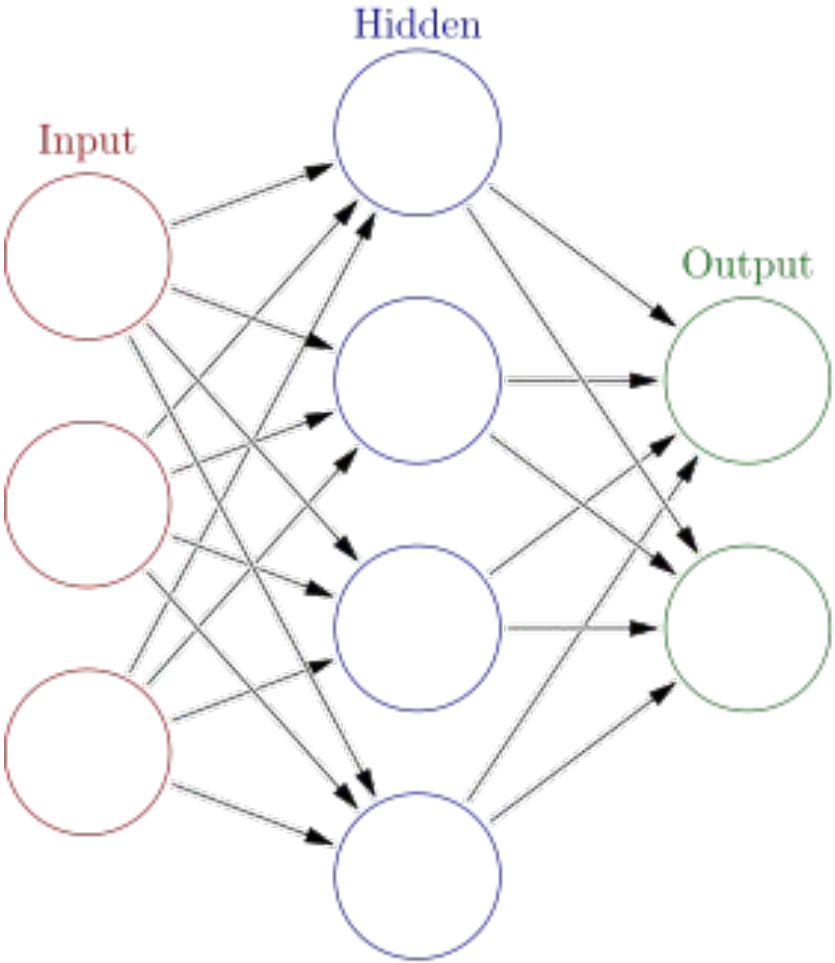
estimate
sale
grow
revenue
investment
net loss
sale increase
cooperation
second quarter
production

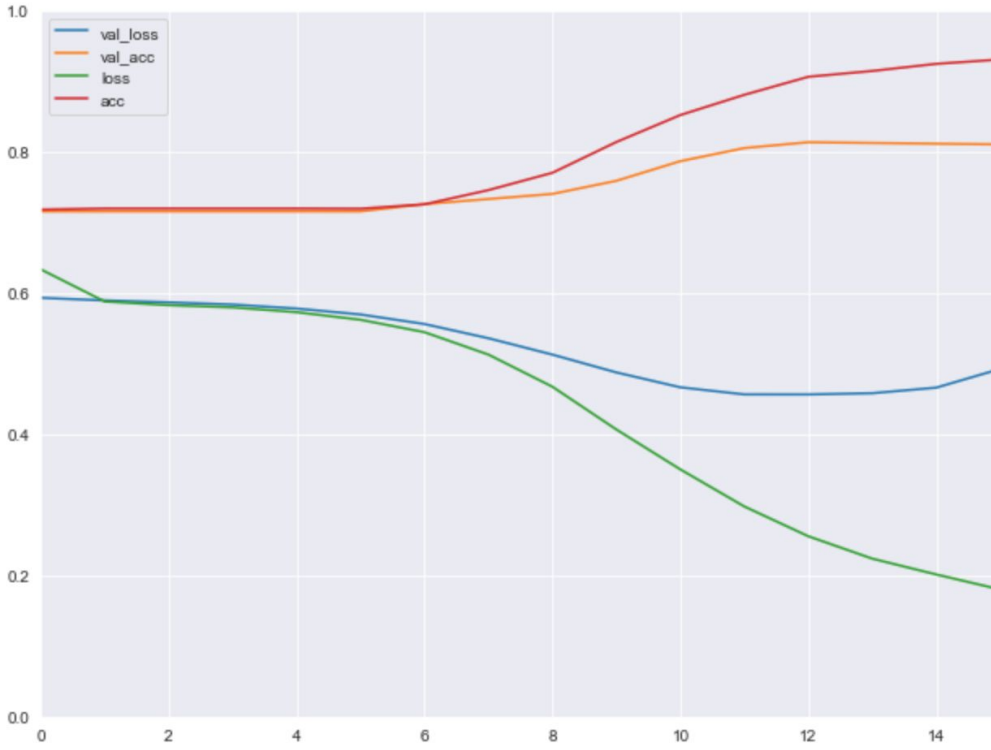
The Model

- Artificial Neural Network
- Embedding Model
- 1 Hidden Layer
- ~ 80% accuracy



Model Evaluation:

- Train Loss: 12.44%
- Train Accuracy: 95.72%
- Test Loss: 50.49%
- Test Accuracy: 82.89%



Results with Real and Imaginary Headlines

(Pre-lemmatized)

Scoring:

- **1** = Positive
- **.5** = Neutral
- **0** = Negative

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Easier Headlines:
stock rise rapid for tesla
apple factory shut down, lay off hundred employee
average day of return for microsoft
[[0.76315194]
 [0.01014708]
 [0.44406658]]


Realistic Headlines:
snowflake more  double  debut  wall street embrace tech ipos
europe economic revival imperil raising the specter grind downturn
fed debate next step after shifting approach to rate setting
[[0.2373167 ]
 [0.16671512]
 [0.25843698]]
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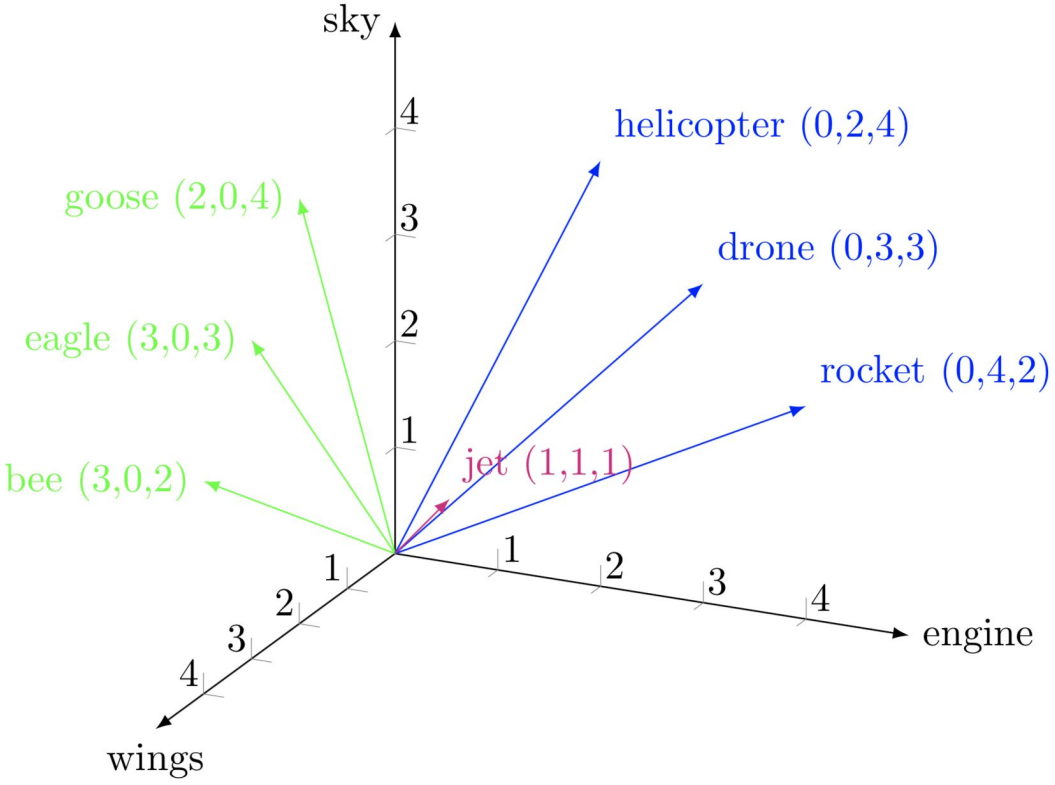
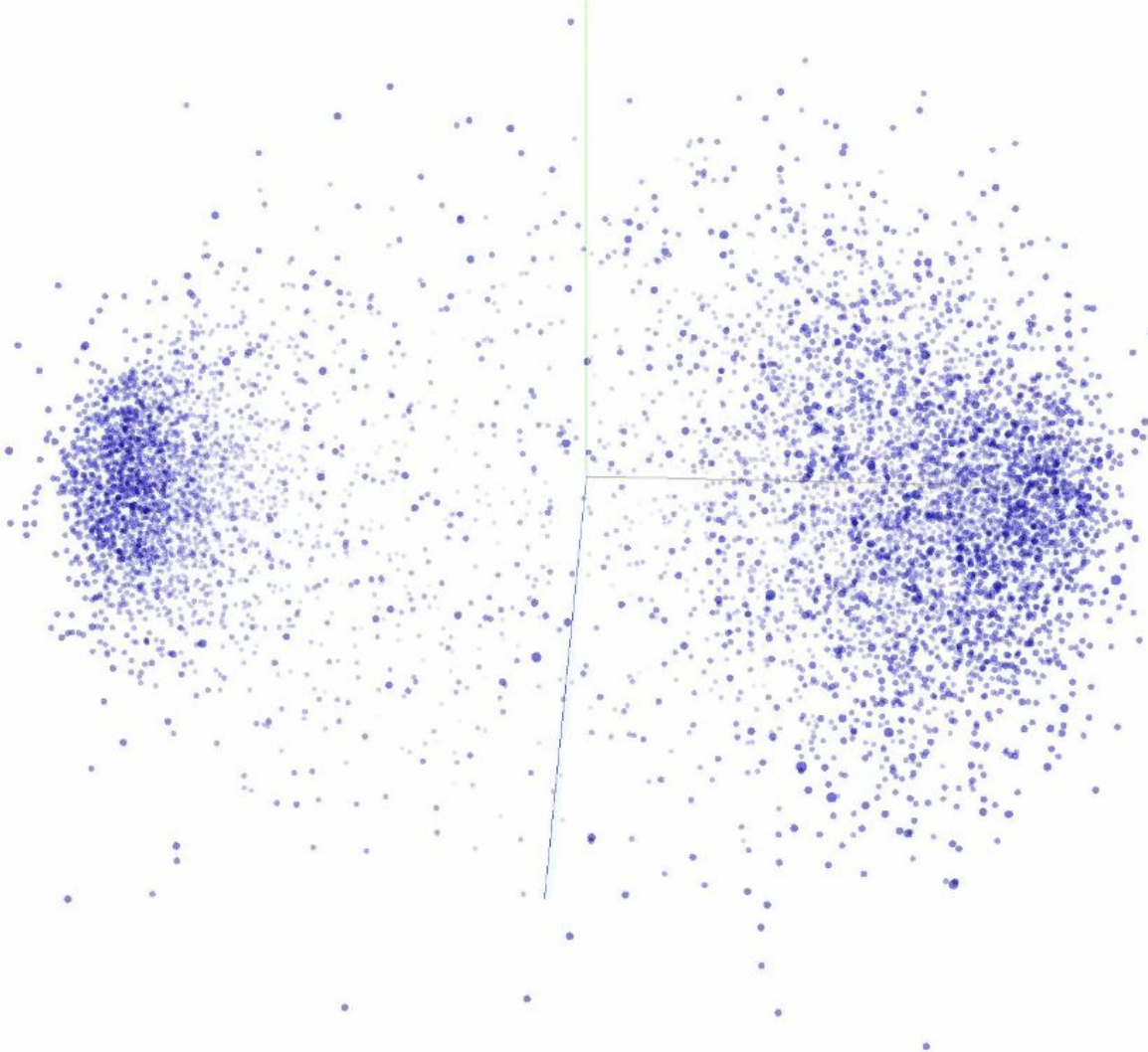
Word Embeddings



Embedding in Action

Positively vs Negatively Associated Words from the model



Future Work:

- Web application to stream financial news headlines
- Different neural network structures
- Different ways of breaking down the NLP structure (Opinion vs Fact for example)

Thanks to Flatiron and my Wonderful Cohort

Please direct questions to thomaskbrown18@gmail.com