US Recession Forecast: November 12, 2019

Danny Cohen, Corporate Intelligence Analyst Intern

1 Recession Probabilities

1.1 Three-month Predictions

December 2019		*January 2020*		*February 2020*
22.64%	$\Longrightarrow$	24.56%	$\Longrightarrow$	25.38%
↑ 20.38		↑ 22.26		↑ 0

1.2 Interpreting the Data

Do not treat these numbers as mere raw percentages. Based on previous analysis, values above 5% indicate an elevated risk of recession; values above 10% indicate a significant risk of recession; and values above 20% indicate near-certainty of recession.

The algorithm is designed to underestimate recession risk, meaning high recession probabilities should not be taken lightly.

Disclaimer: these algorithms were trained exclusively on past recessions. Most downturns share macroeconomic characteristics, which makes prediction a reasonable task. However, any future recession would likely go unnoticed if its causes were novel and previously unseen, at which point prediction would be akin to gambling.

2 Independent Variables & Sources

Key	***Source***
M1	http://www.federalreserve.gov/releases/h6/
DTWEXBGS	http://www.federalreserve.gov/releases/h10/
UMCSENT	http://www.sca.isr.umich.edu/
PERMIT	http://www.census.gov/construction/nrc/
ASPUS	http://www.census.gov/construction/nrs/
HSN1F	http://www.census.gov/construction/nrs/
AWHAEMAN	http://www.bls.gov/ces/
TCU	http://www.federalreserve.gov/releases/g17/
RSXFS	http://www.census.gov/retail/
CPIAUCSL	http://www.bls.gov/cpi/
CPALTT01USM657N	http://www.oecd-ilibrary.org/economics/data/main-economic-indicators/main-economic-indicators-complete-database_data-00052-en
DTWEXB	http://www.federalreserve.gov/releases/h10/
NASDAQCOM	http://www.nasdaq.com/
BOGZ1LM155035015A	http://www.federalreserve.gov/releases/z1/
AMTMNO	http://www.census.gov/indicator/www/m3/
MANEMP	http://www.bls.gov/ces/
INDPRO	http://www.federalreserve.gov/releases/g17/
DJIA	http://www.djaverages.com/
AWHMAN	http://www.bls.gov/ces/
NEWORDER	http://www.census.gov/indicator/www/m3/
IPMAN	http://www.federalreserve.gov/releases/g17/
A36SNO	http://www.census.gov/indicator/www/m3/
MCUMFN	http://www.federalreserve.gov/releases/g17/
TOTBUSMPCIMSA	http://www.census.gov/mtis/www/mtis.html
M2	http://www.federalreserve.gov/releases/h6/
MSPUS	http://www.census.gov/construction/nrs/
ESALEUSQ176N	http://www.census.gov/housing/hvs/
ACDGNO	http://www.census.gov/indicator/www/m3/
IPDCONGD	http://www.federalreserve.gov/releases/g17/
AMDMUO	http://www.census.gov/indicator/www/m3/
AMTMUO	http://www.census.gov/indicator/www/m3/
BUSINV	http://www.census.gov/mtis/www/mtis.html
T10YFF	

CPROFIT	https://www.bea.gov/data/gdp/gross-domestic-product
ICSA	http://www.dol.gov/ui/data.pdf
DTWEXM	http://www.federalreserve.gov/releases/h10/
CSCICP03USM665S	http://www.oecd-ilibrary.org/economics/data/main-economic-indicators/main-economic-indicators-complete-database_data-00052-en
HOUST	http://www.census.gov/construction/nrc/
DGORDER	http://www.census.gov/indicator/www/m3/
AMDMUS	http://www.census.gov/indicator/www/m3/
ACOGNO	http://www.census.gov/indicator/www/m3/
TOTALSA	https://www.bea.gov/national/xls/gap_hist.xlsx
ECOMSA	http://www.census.gov/mrts/www/ecomm.html
UNRATE	http://www.bls.gov/ces/
IC4WSA	http://www.dol.gov/ui/data.pdf
SP500	https://us.spindices.com/indices/equity/sp-500
MICH	http://www.sca.isr.umich.edu/
BSCICP03USM665S	http://www.oecd-ilibrary.org/economics/data/main-economic-indicators/main-economic-indicators-complete-database_data-00052-en
ETOTALUSQ176N	http://www.census.gov/housing/hvs/
LCEAMN01USM659S	http://www.oecd-ilibrary.org/economics/data/main-economic-indicators/main-economic-indicators-complete-database_data-00052-en
PCDG	https://www.bea.gov/data/gdp/gross-domestic-product
MARTSMPCSM44000USS	http://www.census.gov/retail/
RETAILMPCSMSA	http://www.census.gov/mtis/www/mtis.html
CPALTT01USQ657N	http://www.oecd-ilibrary.org/economics/data/main-economic-indicators/main-economic-indicators-complete-database_data-00052-en

Table 1: Independent variables keys and their associated sources.

3 Process

1. Retrieve data for each of the 58 independent variables from FRED server.
2. Clean, interpolate, and aggregate these data.
3. Retrieve dependent variables from FRED, and offset by desired number of months.
4. Combine independent and dependent variables and merge with VMware internal data.
5. Upload tables to *sse_ccmi* schema in PostgreSQL data warehouse:
    - *dc_model_aggregate*: independent variables
    - *dc_model_merged*: independent and dependent variables
    - *dc_model_sources*: independent variables and their sources
    - *dc_model_vmware_sales_2010_onward*: VMware sales 2010-present
    - *dc_model_fred_vmware_combined*: independent and dependent variables, VMware sales data
    - *dc_model_complete*: independent and dependent variables, VMware sales data, dependent-variable predictions
6. Read data into Python's TensorFlow machine learning framework.
7. Divide dataset into five segments, one for each recession in the past 48 years.
8. For each segment: train three new boosted regression tree algorithms on the other four segments and pick the most accurate iteration.
9. Use five algorithms (best one from each segment) to predict state of macroeconomy.
10. Export report as PDF.