



Understanding Affluence: Predictive Modeling Indicates Delay Discounting Is Key Predictor of Salary

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Background

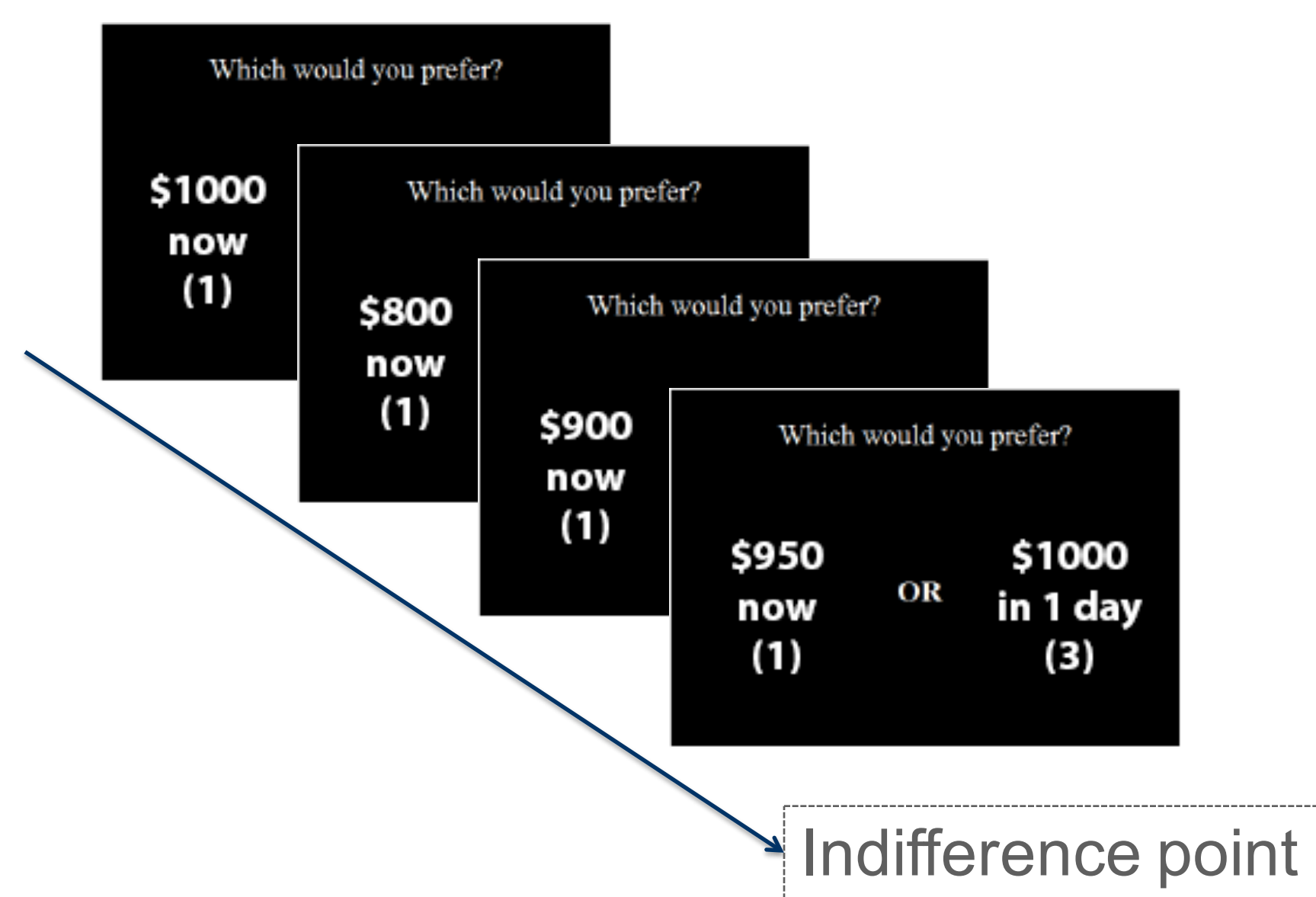
- Salary is a proxy for a wide array of outcomes such as educational attainment^[1], social mobility^[2], career progression^[3], and personal happiness^[4]
- Research has demonstrated that salary is correlated with intuitive variables such as age^[5], level of education^[6] and geographic location^[7], as well as with more oblique ones such as height^[8]
- Other research suggests that **delay discounting**, i.e. a person's relative propensity to devalue future rewards in favor of immediate ones, is also predictive of salary^[9]
- Studies have identified variables that predict salary, but typically have used small, homogenous and/or convenience samples
- No study has modeled such variables simultaneously
- Previous studies tend to assume relationships are linear
- It is unclear how predictive such individual differences in intertemporal choice task behavior are of income, relative to other factors

Research question: What is the predictive power of discounting rate relative to known important demographic variables such as race, gender, education, etc. in predicting salary?

Methods

- 3000 Amazon Mechanical Turk participants
- Aged 25 to 65 (mean age=39, 1311 males)

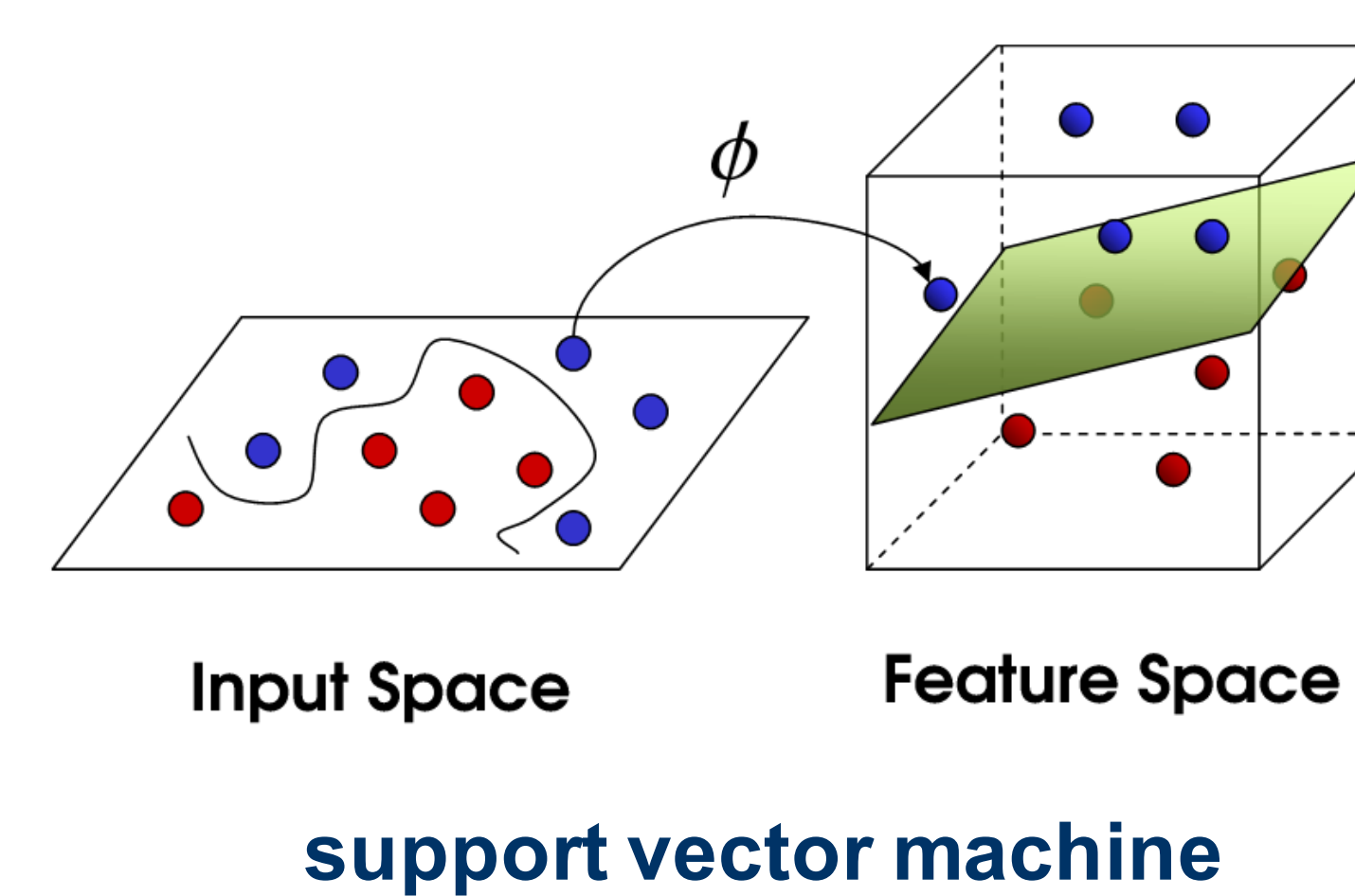
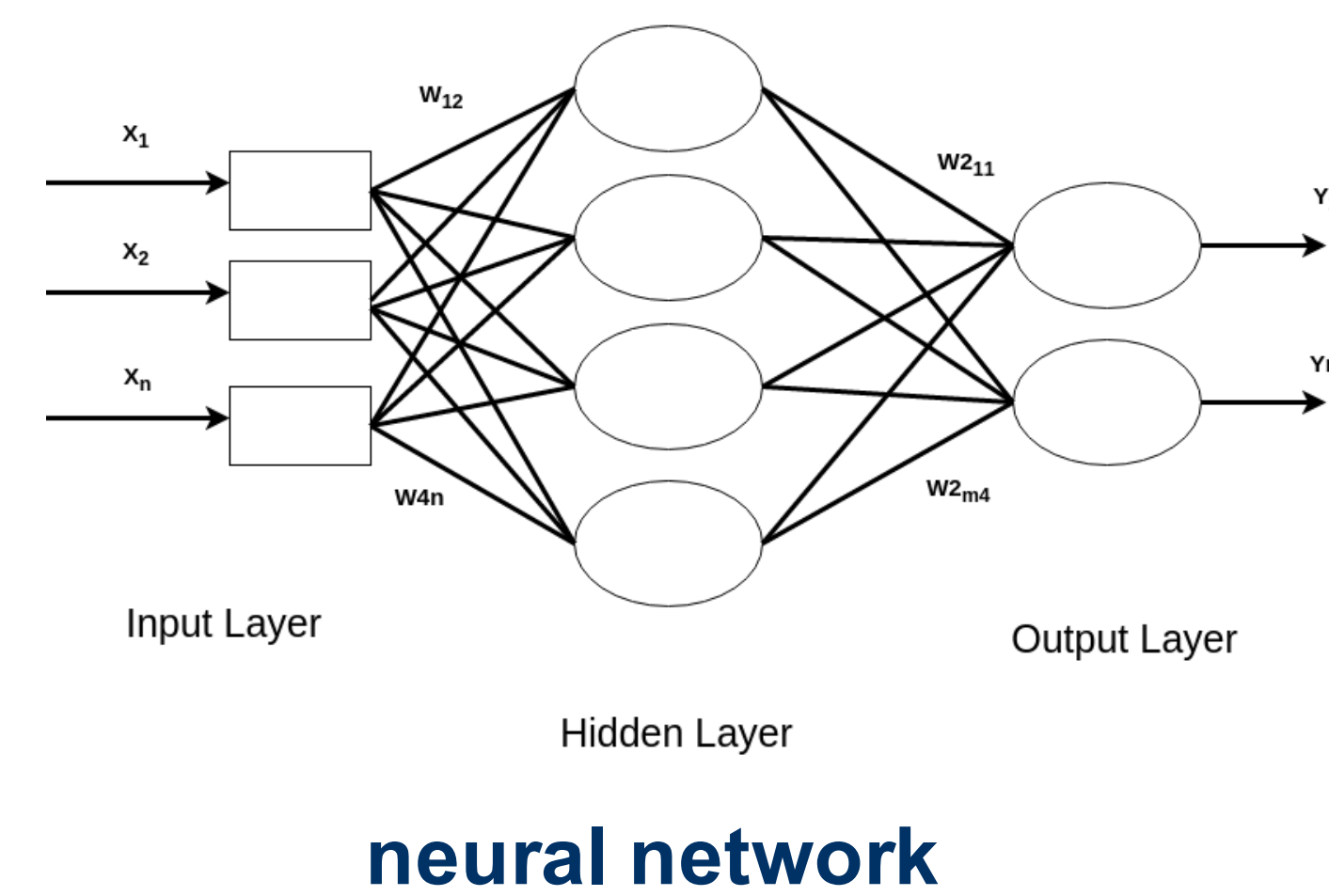
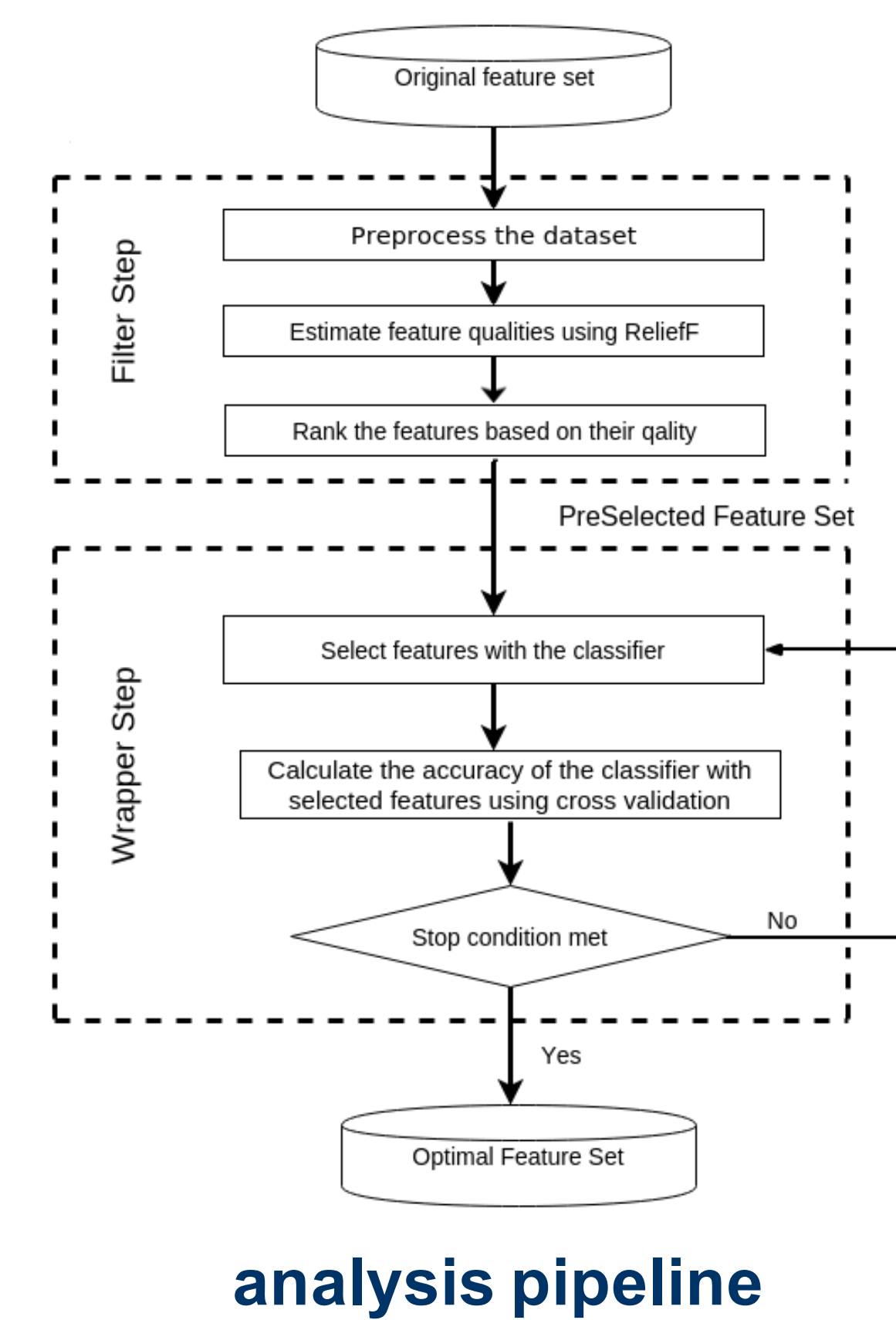
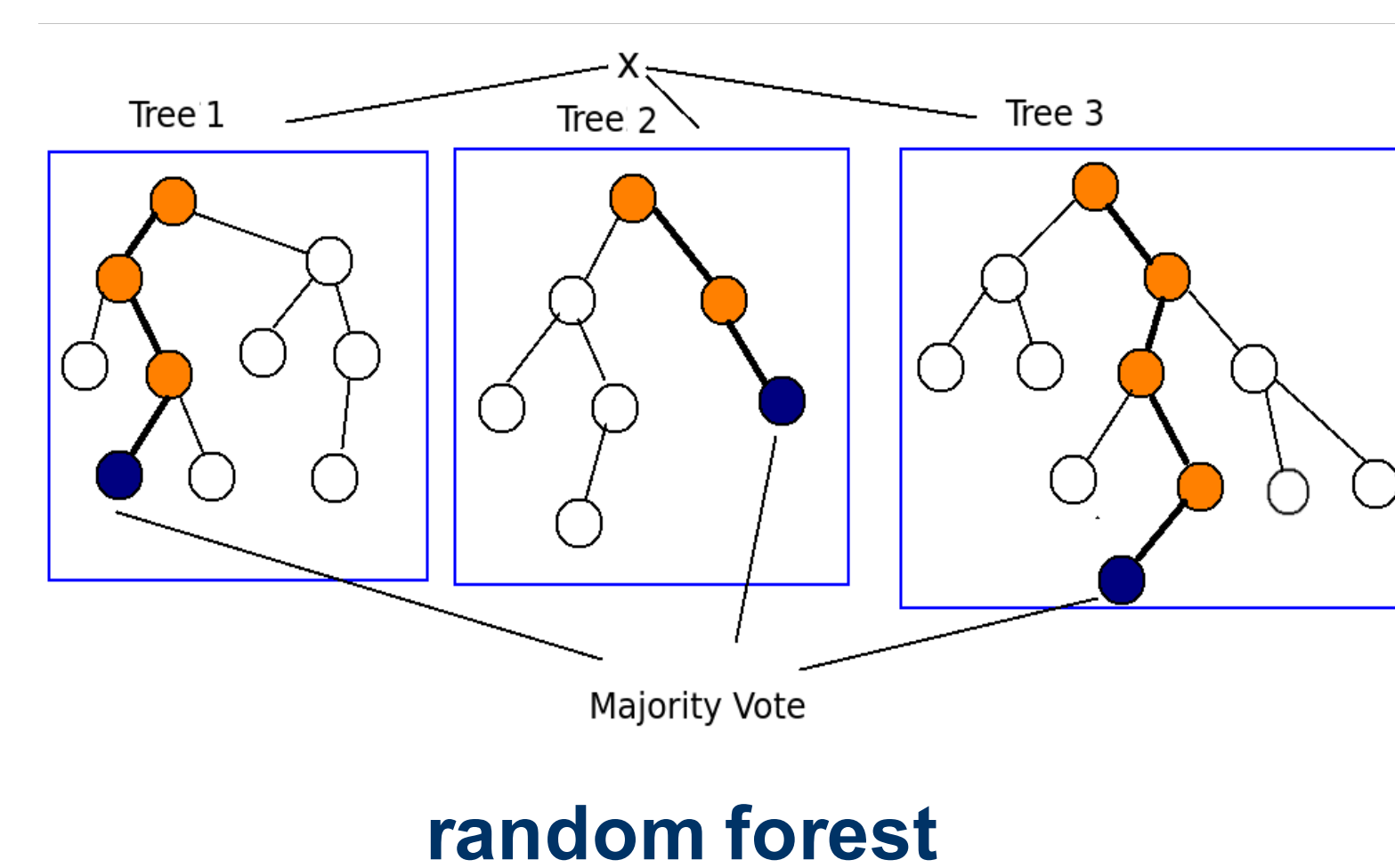
delay discounting behavioral decision task



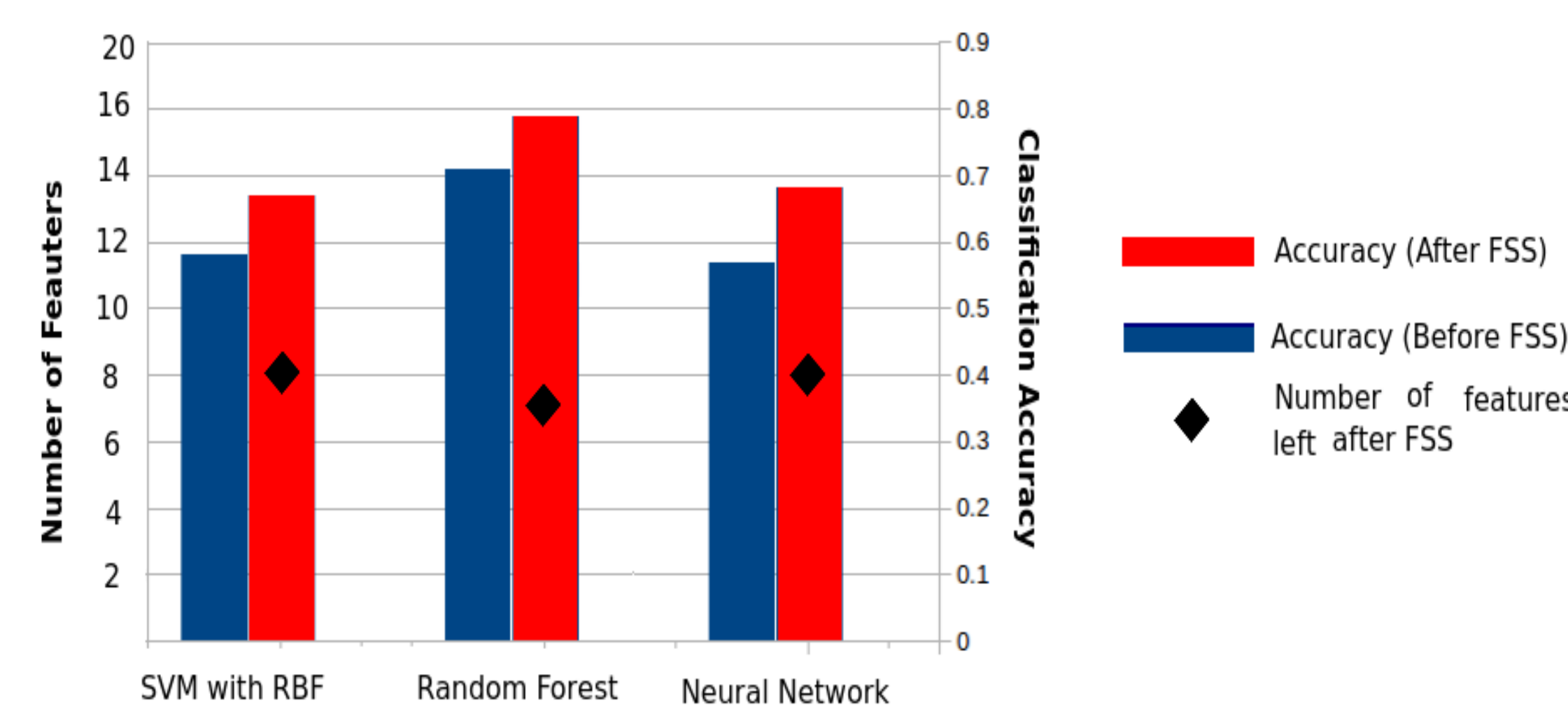
- Over a series of trials, participants selected between hypothetical larger, delayed rewards and smaller, immediate rewards, until participants' choices converged on their **indifference point**^[9]
- Participants then self-reported demographic, salary information, followed by an abbreviated cognitive ability assessment

Predictive Modeling & Analysis

- 480 extreme outliers were removed, leaving 2520 for remaining analysis
- We used a ReliefF algorithm^[10] for filter method, and three classifier approaches for the wrapper phase

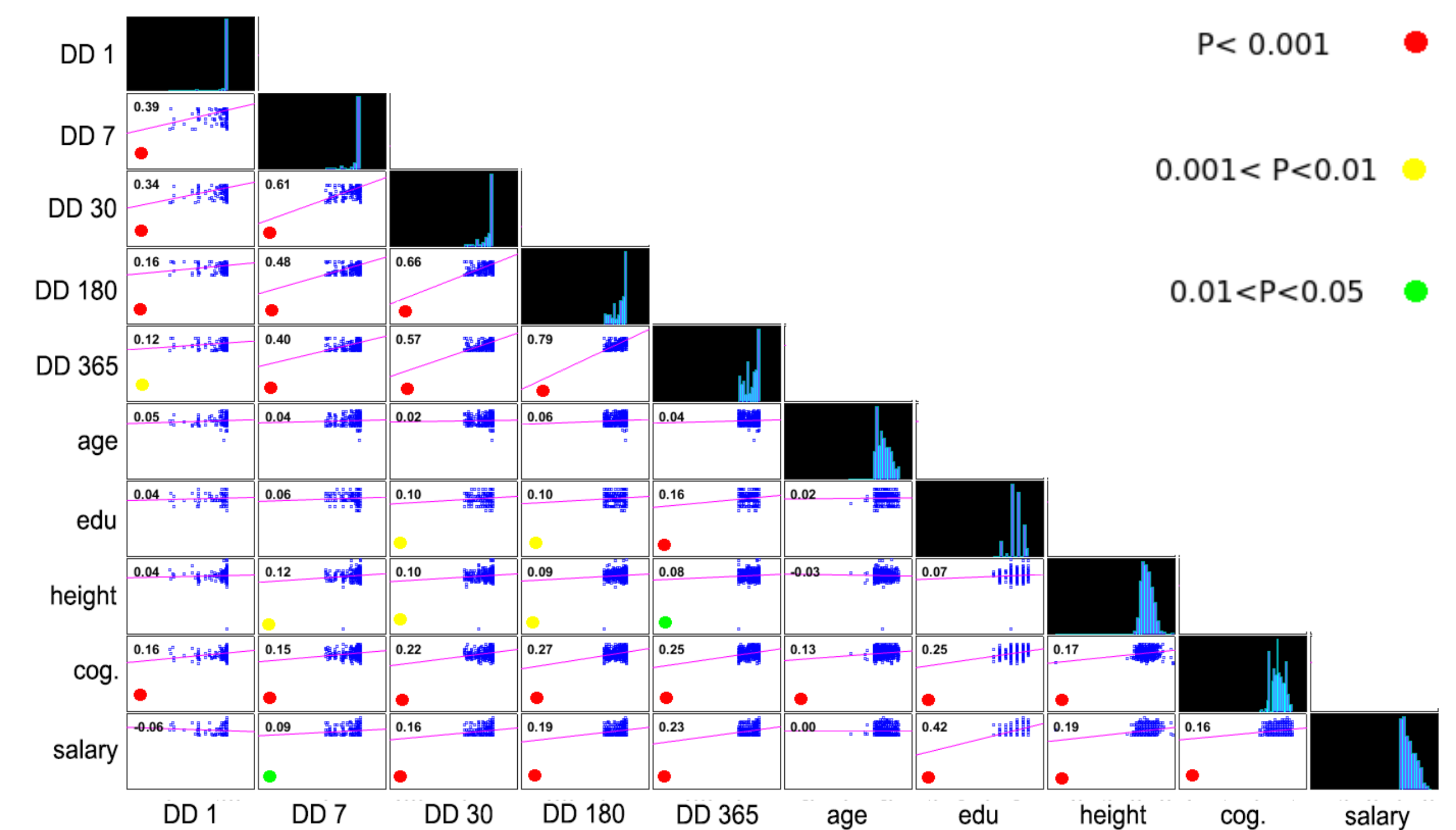


- Data was introduced to three supervised learning algorithms
 - Random Forest
 - Neural Network
 - Support vector machine

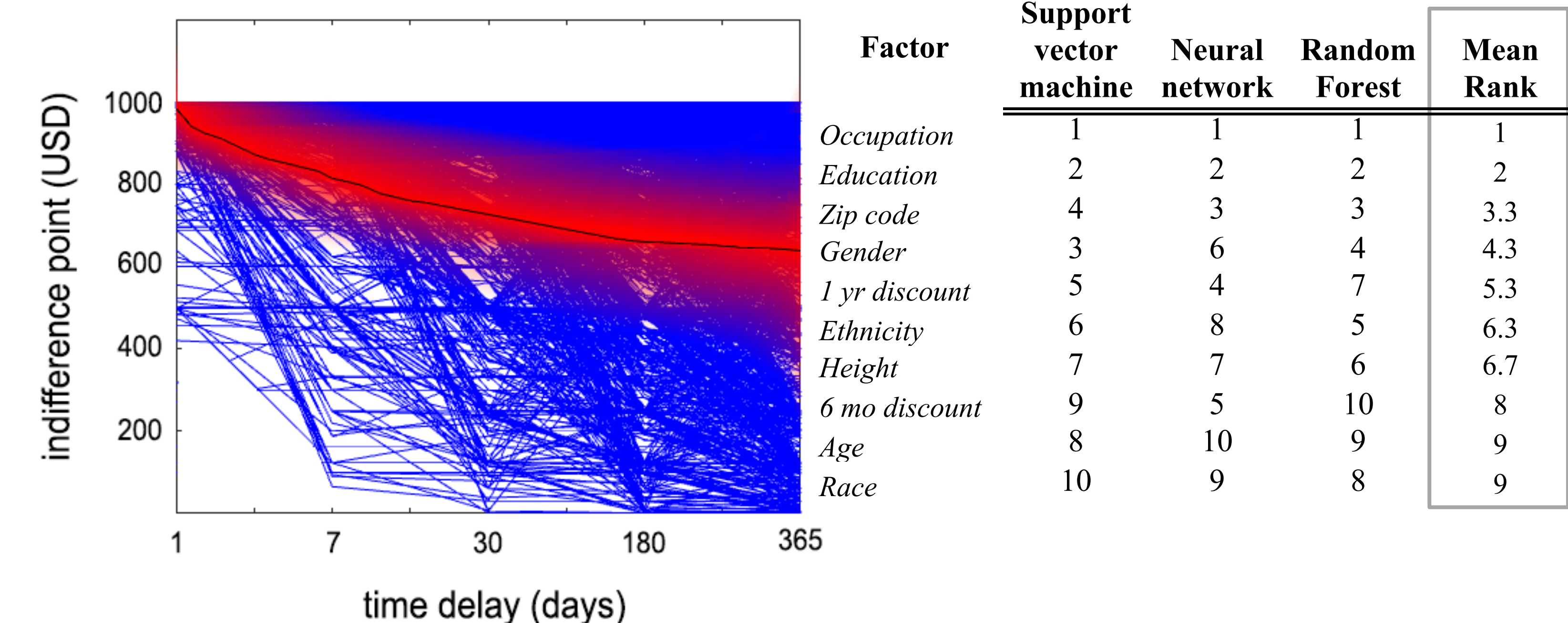


- In the wrapper phase, we removed less important features to increase classification accuracy
- In calculating the classification accuracy, 10-fold cross validation was also performed

Results



- Salary was significantly correlated with discounting behavior, education, height, and cognitive ability



- Individual differences in discounting of future rewards was the fourth most predictive factor examine, outperforming age, race, ethnicity, and height
- Higher discounting of future rewards has been associated with greater impulsivity and reduced cognitive control^[11], and reduced episodic future thinking^[12]
- It is possible that early educational interventions could help people to become less impulsive and more future-oriented. This may have large payoffs for future salary attainment

References: [1] Flamholtz & Lacey *Personnel Review* (1981). [2] Griffin et al. *American Journal of Sociology* (1978) [3] Mitchel *Journal of Applied Psychology* (1975). [4] Kahneman et al. *Science* (2006). [5] Green et al. *Psychology and aging* (1996). [6] Weicher *Review* (1997). [7] Thomas et al. *American Journal of Epidemiology* (2006). [8] Cable, *Journal of Applied Psychology* (2004) [9] Kirby et al. *Organizational Behavior and Human decision processes* (1995). [10] Saeys et al. *Machine learning and knowledge discovery in databases* (2008). [11] Dalley et al. *Neuron* (2011). [12] Peters & Büchel *Neuron* (2010). *authors contributed equally

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