NAVIGATING THE EARLY-STAGE START-UP INVESTMENT LANDSCAPE

Human Investors vs. Machine Learning Algorithms

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- *In a study, machine learning algorithms outperformed Business Angels by accurately predicting the survival outcomes of 60% of start-ups and achieved an average investment return 184% higher than that of Business Angels.*
- *The study reveals three key biases among Business Angels: local bias, overconfidence, and loss aversion.*
- *The shift towards hybrid investment models, combining AI analytics and human judgment, expected to accelerate in the near future.*

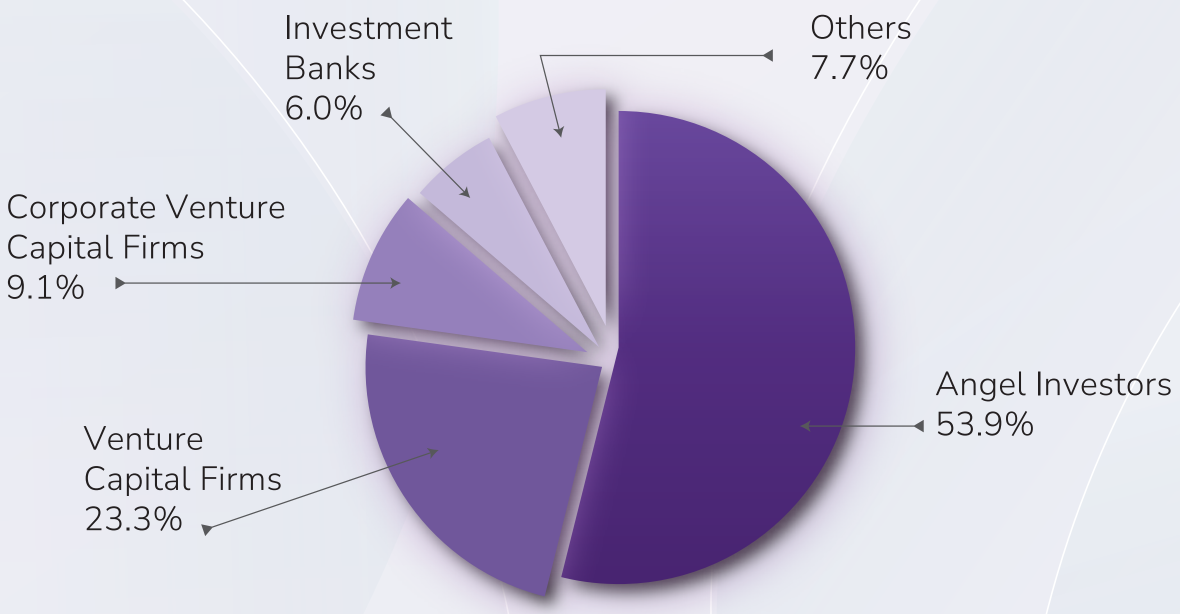
"Start-ups that get help from angel investors are four times more likely to succeed compared to those without their support. So, if you're a start-up, getting an angel investor can be a game-changer[1]."

The arena of investing in early stage start-ups is marked by distinct challenges and prospects. At the forefront are human investors, notably Business Angels (BAs), who bring their intuitive flair, seasoned expertise, and strategic acumen to the table. Investors develop a knack for identifying winners. However, with the advent of machine learning (ML) algorithms, the following question has arisen: **Can machines replace the intuition or gut feel of seasoned investors and make better decisions?**

INDIA LANDSCAPE

In 2022, India saw participation from around 9,500 investors encompassing diverse groups such as angel investors, venture capitalists, corporate and corporate venture capitalists, investment banks, and various accelerators and incubators (Figure 1). Among this mix, angel investors represented the majority, constituting 53% (approximately 5,100) of the total investors.

Figure 1: Share of Different Groups of Investors in Fund Raising in 2022



Source: Inc42 (January 2023)

This article explores the performance of two distinct entities, machine learning algorithms and business angels, in making early stage investment decisions in start-ups, seeking to understand their strengths, limitations, and potential synergies.

[1] CNBC TV18 (November 2023). Leaders Speak - How Angel Investing is Emerging as an Attractive Asset Class in India

MACHINE LEARNING ALGORITHMS: A DATA-DRIVEN PERSPECTIVE

A study titled **It's Peoples Game, Isn't It?! A Comparison Between the Investment Returns of Business Angels and Machine Learning Algorithms,** published in the journal **Entrepreneurship Theory and Practice in 2022,** analyses the effectiveness of machine learning algorithms versus human investors in making early stage investment decisions. This study analyses data from one of the largest European angel investment platforms.

Of the 472 Business Angels on the platform, 255 were selected for this study because their portfolios included at least three companies. This study focused on 623 early stage ventures pre-screened for funding through an angel investment platform. These ventures, founded between 2005 and 2017, had the opportunity to pitch live to network members. By the end of the study period (June 2018), these selected Business Angels had invested in 51 distinct ventures in 14 countries. The machine learning algorithm was applied to investor- and deal-level data and additional data from 422,444 tweets, 11,913 LinkedIn entries, and 757 Google Trends Index keywords mined from public sources such as Twitter, LinkedIn, Google, and official national trade registers to predict survival outcomes and compare the Internal Rate of Return (IRR) achieved by the human Business Angels and ML algorithms. The authors also incorporated checks and balances to address potential bias using data from a single angel investment platform.

Highlights of the study:

1. The machine learning algorithm accurately forecasted the survival outcomes for 60% of the ventures. It also achieved an average investment return that was 184% higher than that of Business Angels.
2. The average Internal Rate of Return for Business Angels in early stage venture investments was 2.6%. In comparison, the machine learning algorithm outperformed the BAs by achieving an average IRR of 7.3%.
3. **The study identified three common decision biases among Business Angels: local bias, overconfidence, and loss aversion.**
    - 3.1. **Local Bias:** Approximately 28% of Business Angels invested at least half of their funds in their own country, with 19% allocating over three-quarters of their investments locally.
    - 3.2. **Overconfidence:** A striking 91% of Business Angels demonstrated overconfidence in their investment decisions, with some investing considerably more than their average amounts.
    - 3.3. **Loss Aversion:** Business Angels showed a tendency towards loss aversion, with an average of only 19% of investments directed towards seed-stage ventures.

There has been tremendous growth in algorithmic trading and investment driven by technological developments in the fields of machine learning and artificial intelligence(AI). This growth has been driven by access to large amounts of quantitative and behavioural data. However, early stage investments are always considered as an old-boys club. Hence, this study raises an interesting question. **Are we over-engineering early-stage investments?**

TRENDS IN INDIAN BUSINESS ANGELS INVESTMENTS

According to the Tracxn Database, over 2,900 Business Angels are investing both domestically and internationally (Table 1)[2].

Table 1: Pattern of Indian Business Angels' Investments

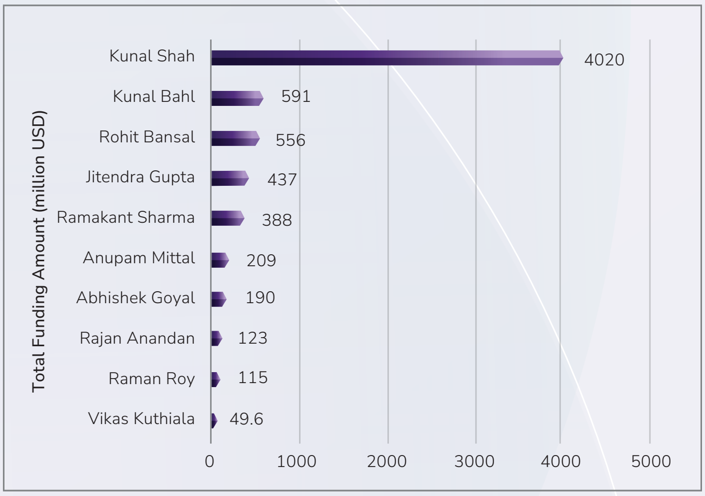
Number of Indian BAs	2974
Share of BAs with at least one Investment in India (any stage)	99%
Share of BAs with at least one early-stage Investment	88%
Share of BAs with at least one early-stage Investment in India	87%

Source: Tracxn Database (as on 13 December 2023)

As the table shows, nearly all Indian investors have made at least one investment in India, demonstrating a strong commitment to the domestic market. Notably, 88% of these investors are engaged in funding early stage start-ups.

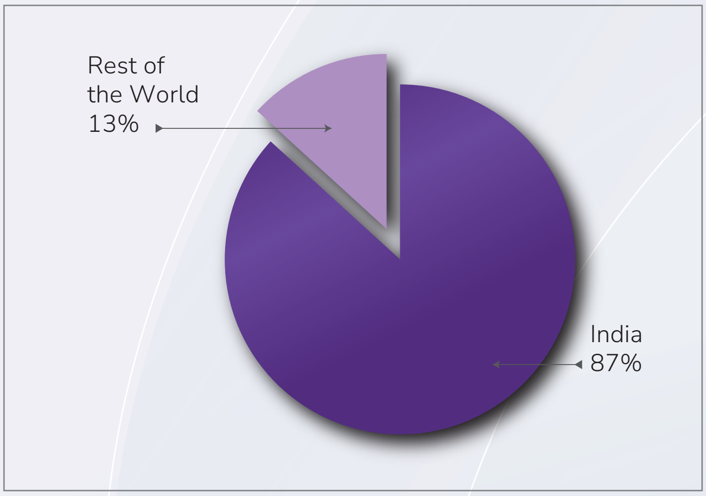
We also studied the investment patterns of the top 10 Indian Angel investors (Figures 2 and 3). We found that 87% of the average funding for early stage ventures was allocated to Indian start-ups.

Figure 2: Early Stage Funding by Top 10 Indian Business Angels



Source: Tracxn.com (as on 13 December 2023)

Figure 3: Geographical Share of Average Total Funding



These data substantiate the presence of a local bias, a preference for investing in one's home country and a certain level of confidence, perhaps bordering on over-confidence in decision-making abilities. However, unlike the study above, Indian Business Angels show a higher willingness to embrace risks by investing in early stage start-ups.

The Indian start-up ecosystem is still nascent compared with the US and Europe. Furthermore, in the absence of a standardised deal information platform, it is difficult to assess whether ML algorithms perform better than Indian Angels. However, sufficient empirical evidence suggests that leveraging AI can improve investment decision making.

[2] Early-stage includes seed, angel, Series A and Series B rounds. Only equity funding is considered.

LEVERAGING AI ACROSS START-UP FUNDING OPERATIONS

Business Angels can integrate AI into their investment strategies in a number of ways:

- **Deal Screening and Due Diligence:** AI algorithms to help screen start-up pitches. These algorithms can quickly process vast amounts of data, identify patterns, and assess the start-up potential.
- **Predictive Analytics:** Once adequate data are available, models can be developed to allow AI to predict success probabilities based on market trends, team compositions, technology stacks, and business models.
- **Portfolio Management:** AI can be used to monitor the performance of portfolio companies. It can track key performance indicators based on public and private information to provide real-time analysis.
- **Market Trend Analysis:** AI systems can analyse market trends and consumer behaviour, providing insights that help angel networks understand emerging sectors or technologies.
- **Networking and Collaboration:** Some angel networks use AI to match investors with start-ups based on investors' interest areas, investment history, and the start-up's sector, stage, and needs.
- **Personalized Recommendations:** AI can provide personalised investment recommendations to individual investors within a network based on their past investments, preferences, and risk appetites.
- **Regulatory Compliance and Reporting:** AI tools can be leveraged to comply with various regulatory requirements and streamline reporting processes.

Conclusion

AI and machine learning have begun to transform investment decisions in several ways. Gartner predicts that by 2025, AI and data analytics will play a role in more than 75% of venture capital and early stage investor assessments[3]. This shift is evident from the efforts of researchers and technologists to actively develop AI and machine learning tools to refine investment strategies. Notable examples include PitchBook's VC Exit Predictor and CB Insights' Mosaic Score. Companies, such as SignalFire, EQT Ventures, and Nauta Capital, use AI-powered platforms[4].

However, these predictions were based on training data, which typically do not account for rare or unpredictable occurrences. As a result, the ability of the algorithm to adapt to and accurately predict outcomes under these exceptional circumstances remains an area of uncertainty. **Consequently, the seasoned judgment and experience of business angels remain indispensable, suggesting a shift towards a more hybrid approach in angel investing decision-making. This hybrid model balances the advanced analytics of AI algorithms with the invaluable insights and intuition gained from human experience.**

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[3] Gartner (2021). Gartner Says Tech Investors Will Prioritize Data Science and Artificial Intelligence Above "Gut Feel" for Investment Decisions By 2025

[4] TechCrunch (March 2023). PitchBook's New Tool Uses AI to Predict Which Startups will Successfully Exit

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